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Synopses of Various Genera of Arecoideæ

21. Veitchia

22. Neoveitchia

23. Reinhardtia

by

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139. VEITCHIA WININ (center) flowering at the Fairchild Tropical Garden, Coconut Grove, Florida. Photograph by Nixon Smiley.

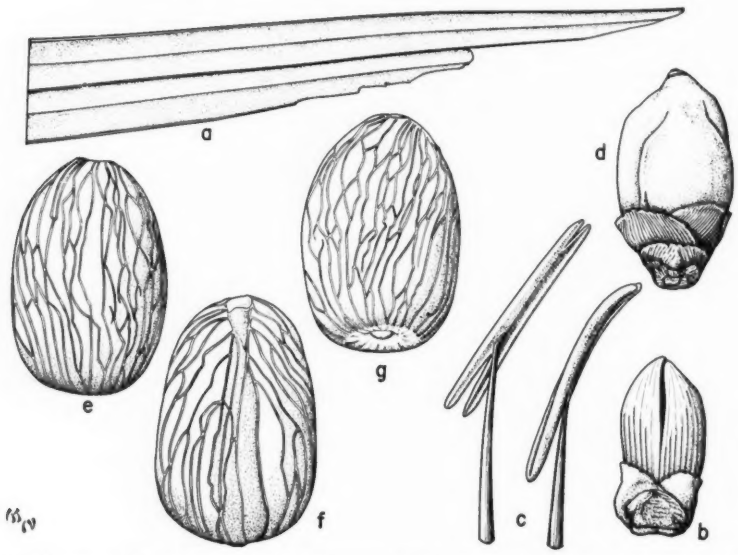
SYNOPSES OF VARIOUS GENERA OF ARECOIDEÆ.

It has been apparent for several years that two distinct species of palms have been cultivated under the name *Veitchia Joannis*. Mr. and Mrs. A. C. Langlois of Nassau, Bahamas, first pointed this out when I studied a handsome specimen tree at their home. I have since compared the Nassau tree with those growing at the Montgomery collection in Coconut Grove, Florida, and, with the help of others, have accumulated a complete series of specimens and notes. In the meantime, other species have matured in gardens of the south so that the cultivated Veitchias today number five—*V. Joannis* and *V. Montgomeryana* which had been confused with the former, *V. Winin* described as new, *V. Merrillii* and *V. sessilifolia* transferred from other genera. During the same period, specimens from the Fiji Islands and New Hebrides Islands have been received for study. In order to work out the identity of these palms, it has been necessary to review the entire genus with regard to its generic relationship and the species included within it. Among palms of the New World, the relationship between Reinhardtia and Malortiea has been studied over the same period. The results of these studies appear herein. They are by no means complete, but they attempt to bring together such information as is now available and to point out the many problems remaining.

Conclusions reached are necessarily my own. They could not have been reached, however, without the assistance of others. I acknowledge with deep appreciation the courtesies extended over the years by the Directors of the Fairchild Tropical Garden, Coconut Grove, Florida, the Atkins Garden and Research Laboratory of Harvard University, Soledad, Cienfuegos, Cuba, and authorities of the United States Plant Introduction Garden, Chapman Field, Coconut Grove, Florida. Mr. and Mrs. A. C. Langlois of Nassau, Bahamas, have patiently provided specimens of flowers and fruit of their Veitchia and the hospitality of their home and garden as well as notes on Reinhardtias as they saw them in British Honduras and in Costa Rica. Mr. Stanley Kiem has assisted in the study of Veitchia in Florida; Mrs. Alvin R. Jennings has most graciously put the palms of the Montgomery collection in Coconut Grove at my disposal. Many others have assisted with information and material, among them R. G. Wilson of South Miami, David Barry, Jr. of Los Angeles, authorities of Longwood Gardens, Kennett Square, Pennsylvania, Professor Mölholm Hansen of Copenhagen, Miss Katherine T. Boynton of Ithaca, New York. A special acknowledgment must be made to Mr. John W.

Parham, of Suva, Viti Levu, Fiji, who has recently made special efforts to provide complete material of *Veitchia Joannis* and Neoveitchia and to Mr. B. E. Parham, for earlier efforts in this direction. Without specimens from Fiji this study would have been severely limited.

Studies in the field during 1952 and 1953 were made possible through grants from the American Philosophical Society and its Penrose Fund, the Bache Fund of the National Academy of Sciences, and in prior and succeeding years with assistance from the Bailey Hortorium and the Fairchild Tropical Garden. Types in European herbaria were studied in 1950 with a grant from Cornell University and again in 1955-56 as a Fellow of the John Simon Guggenheim Memorial Foundation. For loan of specimens, photographs, and other favors I am indebted to the several directors and curators of herbaria cited in the text, abbreviations being those of Index Herbariorum (Reg. Veg. viii, 1956). Illustrations are by Marion Ruff Sheehan and Mitsu Nakayama.



140. VEITCHIA MACDANIELSII. a, tip of pinna ×2; b, staminate flower ×2; c, stamens ×6; d, fruit ×1; e-g, seed, e, antirapheal, f, rapheal, g, lateral views ×2.

ARTICLE 21.

VEITCHIA.

Veitchia, Wendl., honoring James Veitch the British nurseryman (1792-1863) hence pronounced Veechia when anglicized, was described in Seemann's Flora Vitiensis in 1868. The name has since been conserved over the earlier Veitchia of Lindley. As originally described, the genus contained four species, *V. Joannis*, *V. spiralis*, *V. subglobosa*, and *V. Storckii*. The first three were based largely on fruits, the last on more ample material of which foliage, flowers, and fruit were illustrated.

Little more was known about the genus until 1921 when Beccari, writing on palms of New Caledonia in Webbia, recognized that Veitchia was composed of two discordant taxa. He therefore removed *Veitchia Storckii* to a new monotypic genus, Neoveitchia, suggesting that the fruit illustrated by Wendland belonged to Veitchia. In the latter, he retained *V. Joannis*, *V. spiralis*, *V. subglobosa* and added three new species, *V. arecina*, *V. Hookeriana*, and *V. Metiti*. Although Beccari did not provide a description of Veitchia as so emended and although his comment about the fruit of *V. Storckii* has proved unfounded, it is patent from his specific descriptions that the presence of numerous stamens as opposed to six in Neoveitchia was a primary character of the emended genus. The circumscription of Wendland was accepted by Hooker f. (1883), Drude (1889), Baillon (1895), and others before Beccari's emendation. It is apparent that differences in staminate flowers were not appreciated even after Beccari's work for Lemée (1935), and Burret and Potztal (Willdenowia, i, 356, 1956, in key) similarly state that stamens are six.

When Veitchia was recommended for conservation by Green (Kew Bull. 1935, 529), *V. Storckii* was selected as standard species, a choice still reflected in the current International Code of Botanical Nomenclature (Reg. Veg. viii, 224, 1956). As Pichi-Sermolli (Webbia, xi, 99, 1955) and Smith (Journ. Arnold Arb. xxxvi, 274-75, 1955) have pointed out, this was an unfortunate choice for it is clear that the name was meant to stand for the majority of species including the cultivated *V. Joannis* which Pichi-Sermolli has selected as lectotype for the genus. It should be noted, however, that only one of Pichi-Sermolli's reasons for rejecting Green's choice remains valid, namely that *V. Storckii* had previously been removed from the genus and that the lectotype should have been chosen from among residual species. The second reason—that *V. Storckii* was based on a mixed collection—does not apply. Recent collections from the type locality show definitely that the original description and illustrations were correct (see page 540).

Selection of a lectotype for Veitchia is complicated by several factors. It may be argued with some justice that the whole published account best fits *V. Storckii* and that under provisions of Article 8 and Appendix IV 4 d of the Code this species should be restored to the genus and treated as lectotype. Only the description of foliage with præmorse pinnæ can definitely be excluded. This is clearly based on seedlings of *V. Joannis* despite illustrations of an acute pinna of *V. Storckii* in *t. 81*.

On the other hand, description of habit, pistillate flowers and fruit fit *V. Joannis* (and fruit *V. spiralis* and *V. subglobosa*) equally. Seemann's misleading notes concerning *V. Joannis* in Fiji ". . . spadix on which the minute monœcious green flowers are inserted . . ." would lead one to associate it with *V. Storckii* but are scarcely apt since the conspicuous creamy-white flowers of this species are 15-17 mm. long. Wendland allied Veitchia with Ptychosperma, undoubtedly on the basis of leaves and fruit, but differentiated it on characters of the staminate flower. *Veitchia Storckii*, however, has little in common with Ptychosperma or with residual species of Veitchia.

The evidence seems equivocal. Other criteria strongly reinforce Pichi-Sermolli's choice of lectotype. *Veitchia Storckii* had been removed by Beccari, leaving a residue of three congeneric species to which three others were added. Historically, *V. Joannis* has been associated with the generic name more closely and most frequently. It is furthermore appropriate in that the epithet honors John Gould Veitch (1839-1870), grandson of James Veitch. Clearly the intent was to conserve Veitchia for the larger number of species allied with *V. Joannis*. Whether the choice of *V. Storckii* as standard species was mechanical or otherwise, the problems seem to have been overlooked by Green. Beccari's paper in which Veitchia was emended and Neoveitchia erected is cited but there is no evidence to show that it was studied critically. Two other citations from the literature (Fl. des Serres, xix, 17, 1873, and Gartenfl. xxii, 118, 1873) refer to a species that had been erroneously associated with Veitchia in the first place and that had been recognized as *Hedyscepe Canterburyana* since 1875. Other references to Veitchia proper were omitted.

There is no profit in the reinstatement of *V. Storckii* as lectotype. The name Neoveitchia would then be thrown into synonymy, the name Veitchia would not apply in its current or historical sense, the preponderance of species including one cultivated for nearly a century would require names in Vitiphœnix. I have accepted Pichi-Sermolli's choice of *V. Joannis* as lectotype as that best complying with the whole intent of the Code and urge that his conclusions be acknowledged by appropriate international action.

Having ascertained the application of the name Veitchia, its circumscription and relationship must next be considered. It has been noted

that staminate flowers described by Wendland pertain to Neoveitchia. Those of *Veitchia Joannis* are typical of a group of closely related genera placed by Beccari and Pichi-Sermolli in the tribe Ptychospermeæ of the Arecoideæ. As presently constituted, this tribe contains some discordant elements a complete discussion of which must be reserved for the future. Typical genera of the tribe, however, possess in common the following characters:

> pinnate leaves, the sheaths of which form a crownshaft above an infrafoliar panicle subtended by 2 caducous complete bracts; pinnæ with a prominent central nerve, thickened marginal nerves and an oblique to truncate or bifid toothed apex: complex panicle bearing triads of 2 staminate and a central pistillate flower in spiral arrangement along the rachillæ at least below; staminate flowers with rounded imbricate sepals, symmetric valvate petals two and a half or more times as long as the sepals, 8-∞ stamens with filaments not inflexed at the apex and linear more or less sagittate anthers (except Brassiophœnix) around a short and trifid or generally elongate and lageniform pistillode; pistillate flowers smaller than the staminate with imbricate sepals, imbricate petals subvalvate at the apex, dentiform staminodes at the base of a unilocular uniovulate ovary: fruit small to large with apical or eccentrically apical stylar remains, strongly fibrous mesocarp and thin to osseous endocarp enclosing a terete, angled, or sulcate seed, the endosperm homogeneous or ruminate.

Generic characters within this alliance are found for the most part in the fruit and seed. A few genera, such as Normanbya and Drymophlœus, can be distinguished by characters of leaf, panicle, or pistillode, but in the remainder distinction is at best difficult and often impossible without fruit. Genera may be divided readily into two groups, one in which the seed is terete in cross-section, the other in which the seed is variously angled or sulcate. A less easily discernible distinction is in the structure of the fruit-coat. Here again genera fall into two groups, one (including Balaka, Brassiophœnix, Drymophlœus, Ptychococcus, Ptychosperma, and Strongylocaryum) in which the outermost layer contains very many small translucent included sclerosomes visible in both the fresh and dried state, another (including Normanbya, Rehderophœnix, and Veitchia) in which either the outermost layer is minutely puncticulate with translucent ends of very slender elongate outer fibers of the thick fleshy fibrous mesocarp when fresh and opaque when dry or in which the exocarp is thin and closely appressed to the underlying elongate or shortened and sometimes partially included (?) fibers of a rather thinly fleshy mesocarp so that in the dried state the surface is lineolate or pebbled. The latter state, particularly noticeable in small-fruited species of Veitchia (e.g. *V. petiolata*, *V. sessilifolia*, *V. simulans*), may be transitional to the more usual sclerosomatic condition. A thorough histological study is required before the entire significance of the fruit-coat is understood here.

The key that follows on page 487 does not always reflect relationship but may serve to distinguish genera as I interpret them. It will be noted that the treatment is conservative and perhaps may someday be more so when the relationship between Ptychococcus and Ptychosperma is better understood. Veitchia, in its single-stemmed habit, large size, relatively unspecialized pinnæ, staminate flowers with numerous stamens and well developed pistillode, fruit lacking completely included sclerosomes in the exocarp, and terete seed, appears to be least specialized of the genera in the alliance. Normanbya and Rehderophœnix appear to be most closely related, while Strongylocaryum, though contrasted with Veitchia, would be included in Ptychosperma were it not for the terete seed. I have united Adonidia, Kajewskia (?), and Vitiphœnix with Veitchia on grounds that follow.

Unless bolstered by additional characters, ruminate endosperm is not a reliable generic criterion in arecoid palms. Beccari and Burret have abandoned its use, for in the past it has led to the division of such natural genera as Euterpe, Hydriastele, Nengella, Reinhardtia, Synechanthus. In the ptychospermate group, Drymophlœus, Ptychococcus, and Ptychosperma include species with ruminate as well as homogeneous endosperm.

Ruminate endosperm appears to be the sole differentiating factor between the monotypic genus Adonidia from the Philippines and Veitchia from the New Hebrides, New Caledonia, and Fiji Islands. Thus, the relationship between these two genera has been carefully examined. Adonidia is commonly cultivated in Florida where it was compared with several species of Veitchia in March 1957. When grown in full sun, the internodes of the trunk are very short, the crown is condensed, and the 14-15 leaves have a characteristic arch with the pinnæ ascending from the rachis (Fig. 144) while Veitchia ordinarily has elongate internodes, a rather more elongate crown of about 10 leaves. These vary in character. Leaves of *V. Joannis* are spreading when mature with the pinnæ hanging gracefully from the rachis; those of *V. Montgomeryana* and to a lesser extent of *V. Winin* tend to be more erect and the pinnæ are borne in a more nearly horizontal plane (Fig. 139); those of *V. sessilifolia* and its allies approach leaves of Adonidia especially in the ascending pinnæ of the arcuate tips (Fig. 152). Adonidia, when grown in the cover of large trees, however, has elongate internodes, spreading leaves with nearly horizontal pinnæ, and is not readily distinguished from *V. Montgomeryana* or *V. Winin*. Although pinnæ of Adonidia tend to be slender at the apex, they are characteristically toothed and are matched by foliage of *V. Macdanielsii* and other species. Examination of staminate and pistillate flowers shows no difference whatsoever. Except for the more highly vascularized seed with ruminate endosperm and slightly smaller size, the fruits of *Adonidia Merrillii* cannot be distinguished from those of *Veitchia Montgomeryana*.

The distribution of Adonidia in the Philippines lies well beyond the range of Veitchia as presently known, but the species is clearly allied with species of Veitchia from the New Hebrides in its lepidote pinnæ. A similar gap in distribution is found in Drymophlœus which occurs in the Moluccas, New Guinea, and then in Samoa without intervening records. Normanbya, the genus most closely allied to Veitchia, occurs in Queensland, Australia. The isolation of Adonidia, which may be more apparent than real due to inadequate collecting of palms in the Pacific Islands, is not a convincing argument for maintaining it apart.

Because of its prominence as an ornamental palm, it is with considerable reluctance that Adonidia is placed in Veitchia. To retain it, however, would be to retain an artificial taxon and to prolong a usage that might have disappeared before had the true nature of Veitchia been well understood. So close is the apparent relationship to *V. Montgomeryana* and *V. Macdanielsii* that I have not erected an infrageneric category for it.

The inclusion of two other genera requires less explanation. Kajewskia is discussed more fully with *Veitchia spiralis*. The type collection, although it lacks fruit, is comparable with Veitchia in all other respects and is referred with a query only because of incomplete material. Vitiphœnix differs from Veitchia as heretofore circumscribed only in the smaller fruit. The outer layer of the mesocarp fibers is sometimes composed of shortened and thickened fibers that are prominent under the very thin exocarp when dry, a condition to be noted also in *V. Joannis* to a lesser degree and in *V. simulans*. Superficially, such species as *V. petiolata* or *V. sessilifolia* appear to have sclerosomes similar to those of Ptychosperma but the fresh fruit shows the relationship with Veitchia and an intermediate condition is found in *V. vitiensis*. I have no hesitation in uniting the two genera.

Ptychospermate genera, then, may be separated as follows:

1. Seed terete in cross-section.

   2. Leaves with entire, cuneate and several-nerved pinnæ in the juvenile state, in mature plants the pinnæ divided into 2-8 nearly linear 1-5-nerved segments clustered in alternating groups along the rachis, each of the outermost segments in each group with 1 thickened marginal nerve, the remainder with thickened midnerves only, elongate chaffy scales not present on the midnerves below: bracts caducous, the inner included within the outer: flowering nodes closely spiralled on the rachillæ: fruit broadest at the base, tapered to the apex, the mesocarp thick, very strongly fibrous, subligneous at maturity; endosperm deeply ruminate. Queensland, Australia . . . . NORMANBYA

   2. Leaves not as above.

      3. Pinnæ cuneate in outline but not divided in the mature leaf, lacking chaffy scales on the midnerve below: the terete and prominently rostrate inner bract inserted well above and exserted from the outer, both bracts marcescent on the peduncle: staminate flowers with short and trifid or lageniform pistillode: seed with homogeneous or ruminate endosperm. Moluccas, New Guinea, Samoa (including *Coleospadix* and ?*Solfia*) . . . . . DRYMOPHLŒUS

3. Pinnæ not cuneate, the sides in general more or less parallel and the apex not wider than the middle.
   4. Pistillode very short, trifid; hilum orbicular, basal; flowers borne in shallow depressions along thickened rachillæ; inner bract inserted above and exserted from the outer; endosperm homogeneous. Solomon Islands ..... REHDEROPHŒNIX
   4. Pistillode lageniform; hilum elongate; flowers superficial on the rachillæ; inner bract inserted close to and included within the outer.
      5. Exocarp of the fruit with minute included sclerosomes, these visible as translucent areas when fresh and when dry; mesocarp with a layer of red tannin cells next to a single layer of flat reticulate fibers adnate to the membranous endocarp; fruit small, less than 2 cm. long, the seed with deeply ruminate endosperm. Solomon Islands ..... STRONGYLOCARYUM
      5. Exocarp of the fruit apparently lacking completely included sclerosomes and without translucent areas when fresh except for minute puncticulation where ends of a layer of very slender underlying fibers are attached in large fruits, in some species with small fruits the very thin exocarp closely adherent to slender elongate or shortened and thickened outer fibers of the mesocarp and partially including them, when dry appearing lineolate or pebbled; mesocarp lacking a layer of red tannin cells, with two or more layers of flattened fibers readily separable from the chartaceous to vitreous endocarp; endosperm homogeneous or if ruminate then the fruit more than 2.5 cm. long. Philippine Islands, New Hebrides, New Caledonia, Fiji Islands (including *Adonidia*, ?*Kajewskia*, and *Vitiphœnix*) ..... VEITCHIA

1. Seed strongly angled or sulcate in cross-section.
   6. Seed angled in section, acute; fruit often angled and tapered to both ends; inner bract inserted well above and exserted from the outer, the peduncle elongate; endosperm homogeneous. Fiji Islands, Samoa ..... BALAKA
   6. Seed 3-5-sulcate in section; inner bract inserted close to and included within the outer, the peduncle short.
      7. Anthers tapered and entire at the base; pistillode small, narrowly cylindric and undivided or completely lacking: pinnæ strongly cuneate: fruit very strongly 5-angled when dry, the fibers of the mesocarp apparently entirely fused to the endocarp, the seed with 5 acute ridges and homogeneous endosperm. New Guinea ..... BRASSIOPHŒNIX
      7. Anthers deeply sagittate at the base; pistillode lageniform: fruit rounded or irregularly ridged when dry, the seed with 5 rounded ridges and homogeneous or ruminate endosperm.
         8. Fibers of the mesocarp applanate on the thin endocarp; seed rounded at the apex. Australia, New Guinea, Bismarck Archipelago, Solomon Islands, Micronesia (including *Actinophlœus* and *Ponapea*) ..... PTYCHOSPERMA
         8. Fibers of the mesocarp partially fused with the osseous endocarp, free only toward the base; seed acute at the apex. New Guinea to Solomon Islands ..... PTYCHOCOCCUS

VEITCHIA, Wendl. in Seem. Fl. Vitiensis, 270 (1868), emend. Becc. in Webbia, v, 76 (1921) and xi, 99 (1955), nomen conservandum; not *Veitchia*, Lindl. in Gard. Chron. 1861, 265, nomen rejiciendum; Wendl. & Drude, in Linnæa, xxxix, 181 (1875), pro parte; Hook. f. in Benth. & Hook. f. Gen. Pl. iii, 887 (1883), pro parte; Drude, in Engler & Prantl, Nat. Pflanzenfam. II, iii, 74 (1889), pro parte; Baill. Hist. Pl. xiii, 366 (1895), pro parte;

Lemée, Dict. Descr. & Syn. Gen. vi. 842 (1935), pro parte. Lectotype: *Veitchia Joannis*, Wendl.*

Adonidia, Becc. in Phil. Journ. Sci. xiv, 329 (1919); Bailey, in Gent. Herb. iii, 435 (1935); Becc. & Pichi-Sermolli, in Webbia, xi, 65 (1955). Type: *Adonidia Merrillii*, (Becc.) Becc.

?*Kajewskia*, Guill. in Journ. Arnold Arb. xiii, 113, fig. 2 (1932); Becc. & Pichi-Sermolli, in Webbia, xi, 114 (1955). Type: *Kajewskia aneityensis*, Guill.

Vitiphœnix, Becc. in Ann. Jard. Bot. Buitenzorg, ii, 91 (1885); Baill. Hist. Pl. xiii, 343 (1895); Burret, in Fedde Repert. xxiv, 282 (1928); Lemée, Dict. Descr. & Syn. Gen. vi, 879 (1935); Becc. & Pichi-Sermolli, in Webbia, xi, 97 (1955). Type: *Vitiphœnix filifera*, (Wendl.) Becc.

Vitiphœnix subgen. *Euvitiphœnix*, Burret, in Bernice P. Bishop Mus. Occ. Papers, 11 (4), 7 (1935).

Vitiphœnix subgen. *Acmophœnix*, Burret, op. cit. 8 (1935); Becc. & Pichi-Sermolli, in Webbia, xi, 97 (1955).

Moderate to tall, slender-trunked, solitary, unarmed, monœcious palms with infrafoliar panicles and pinnate leaves borne in a spreading to suberect crown with $\frac{1}{5}$ phyllotaxy, the closed sheaths elongate, forming a columnar crownshaft: pinnæ numerous, reduplicate, united in bud by continuous fragmenting or basally persistent loræ, with prominent central and thickened marginal nerves and several finer intermediate nerves or the apical pair with several primary nerves, narrowed at the base, the apex broad, obliquely truncate and toothed or obliquely acute or acuminate and toothed, the upper margin usually longest, midrib usually vestite near the base below with elongate basifixed twisted chaffy scales, the surface, nerves, sheath, and axes variously vestite: panicles subtended by 2 caducous pergamentaceous bracts, the outer ancipitous, acute, enclosing the shorter but similar inner bract, short- to moderately long-pedunculate, much ramified into slightly to markedly flexuous subulate-tipped ultimate rachillæ bearing flowering nodes in a loose spiral or often subdistichous toward the apex, the nodes subtended by inconspicuous very narrow bractlets with triads of a central pistillate and 2 lateral staminate flowers nearly throughout or only near the base of the rachillæ, the upper nodes with collaterally paired or solitary staminate flowers; staminate flowers ebracteolate, the sepals imbricate, rounded, less than half as long as the slightly asymmetric to symmetric valvate cymbiform petals, stamens numerous with subulate filaments united at the base, distinct above and not inflexed at the apex, anthers linear, basifixed or dorsifixed with deeply sagittate bases and acute to generally emarginate or bifid apices, the locules dehiscing by longitudinal slits, pistillode equalling the stamens, attenuate from a bulbous base, generally trifid apically; pistillate flowers subtended by a pair of persistent inconspicuous to prominent bracteoles, the sepals imbricate, rounded, not much shorter than the petals, these imbricate with erect subvalvate apices, the entire perianth enlarged, per-

* Pichi-Sermolli, in Webbia, xi, 101 (1955).

sistent and spreading or sheathing at the base of the fruit, pistil ovoid with short soft unilocular ovary containing a single laterally attached ovule, thickened style and 3 sessile stigmas recurved at anthesis, staminodes 3-6, dentiform, inserted at the base of the ovary, usually variously connate and conspicuous at the base of the fruit: fruit small to moderately large, red or orange-red at maturity, the style persistent as an apical or eccentrically apical umbo, exocarp smooth and lacking completely included sclerosomes but in species with small fruit closely adherent to the underlying fibers appearing lineolate or pebbled when dry, mesocarp yellowish, thin-pulpy, with a layer of very slender or short and thickened fibers attached at one end to the exocarp and 1-several layers of elongate flattened fibers united apically, eventually distinct at the base, endocarp thin to thickish, chartaceous to cartilaginous or subvitreous, fragile, in some species fracturing transversely; seed ellipsoid to ovoid, truncate at the base, rounded to acute at the apex, attached laterally along an elongate hilum, vascular strands of the seed-coat simple, furcate, or much anastamosed, descending from the apex and sides of the raphe, endosperm homogeneous or ruminate, embryo basal.

Eighteen species occur in the Philippine Islands, New Hebrides, New Caledonia, and Fiji Islands.

Specific criteria in Veitchia are found primarily in the presence or absence of minute lepides on the lower surface of secondary nerves in the pinnæ, in the number of stamens, distribution of pistillate flowers on the panicle, size and shape of fruit and seed, vascularization of the seed-coat and character of the endosperm.

The prototype of the genus appears to have been a palm with lepidote pinnæ, a large panicle on which pistillate flowers were borne at all the nodes, staminate flowers with numerous stamens, large fruit, and seed with homogeneous endosperm. Species appear to have evolved along different lines. *Veitchia Montgomeryana* and *V. Macdanielsii* seem close to this hypothetical prototype with *V. Merrillii* derived through rumination of the endosperm, *V. Winin* through reduction in stamens and fruit. This obvious relationship of *Veitchia Merrillii* and the apparent lack of great significance in the character of ruminate endosperm have led me to refrain from erecting an infrageneric category for it until the genus as a whole is better understood.

Restriction of pistillate flowers to the lower nodes of the rachillæ is presumed to occur in *Veitchia arecina* and *V. Metiti*, is established in *V. Hookeriana* and *V. Joannis*, and probably so in *V. spiralis* if the last is similar to or equal to Kajewskia. It is by no means certain that these species are closely related, however. *Veitchia simulans* bears a strong resemblance to *V. Joannis* in fruit but is closer to the species from the New Hebrides in other characters. Two complexes of taxa centered on *V. filifera* and *V. vitiensis* appear to have evolved primarily through reduction in the size of the fruit and in number of stamens.

Material for study has largely been fragmentary. The account of species, therefore, leaves much to be desired and six of them cannot be placed accurately in a key. Proper status for several taxa in the Fiji Islands cannot be ascertained on the basis of present collections. An attempt has been made, however, to lay the groundwork for a more satisfactory understanding of the limits and position of the genus and some confusion existing among the cultivated species has been clarified.

Key to species of Veitchia

1. Pinnæ minutely and more or less densely lepidote along the secondary nerves below throughout or nearly throughout their length.
   2. Lepides on secondary nerves shining red-brown. Fiji Islands.
      3. Fruit ca. 4 cm. long, 3 cm. in diameter..... see *V. subglobosa* (16)
      3. Fruit 21-22 mm. long, 12-13 mm. in diameter.....5. *V. simulans*
   2. Lepides on secondary nerves predominantly pale-membranous with a light brown center, those near the margin of the leaf sometimes intermixed with rusty scales.
      4. Endosperm ruminate. Philippine Islands.....4. *V. Merrillii*
      4. Endosperm homogeneous.
         5. Fruit (14-) 18-19 mm. long: stamens ca. 50. New Hebrides...3. *V. Winin*
         5. Fruit 3.3 cm. long or more: stamens (when known) 100 or more.
            6. Pistillate flowers borne only at the lowermost 2-4 nodes of the rachillæ, the upper nodes bearing staminate flowers only and the rachillæ strongly flexuous or short and stiff. See *V. Hookeriana* (13), *V. Metiti* (14), *V. spiralis* (15), *V. subglobosa* (16).
            6. Pistillate flowers borne throughout or nearly throughout the length of the elongate nearly straight or only slightly flexuous rachillæ.
               7. Fruit (3.9-) 4.5-4.6 cm. long, (1.8-) 2.4 cm. in diameter: stamens 130-140. Cultivated, of unknown origin.....1. *V. Montgomeryana*
               7. Fruit 3.3-3.5 cm. long, 1.7-1.9 cm. in diameter: stamens ca. 100. New Hebrides.....2. *V. Macdanielsii*

1. Pinnæ not lepidote along the secondary nerves below except for scattered scales similar to those on the upper side of the rachis, these borne at the very base.
   8. Fruit 4.5-6 cm. long: pistillate flowers borne only at the lowermost 2-4 (-6) nodes of the rachillæ, the upper nodes bearing staminate flowers only and the rachillæ often strongly flexuous. See also *V. Hookeriana* (13), *V. Metiti* (14), *V. spiralis* (15), *V. subglobosa* (16).
      9. Seed ovoid, acute, ca. 3.5 cm. long, 1.9-2.1 cm. in diameter; fruit 5.3-6 cm. long, 2.5-3 cm. in diameter: panicle lepidote-floccose when young but becoming glabrate in age; anthers acute and shortly mucronulate at the apex. Fiji Islands.....6. *V. Joannis*
      9. Seed subglobose, rounded at the apex, 2.5 cm. long, 1.8 cm. in diameter; fruit 4.5 cm. long, 3 cm. in diameter: panicle glabrous; anthers deeply emarginate or bifid at the apex. New Caledonia.....7. *V. arecina*
   8. Fruit less than 2.5 cm. long: pistillate flowers borne throughout or nearly throughout the length of the nearly straight or only slightly flexuous rachillæ. See also *V. filifera* (17), *V. Pickeringii* (18). Fiji Islands.
      10. Outermost fibers of the mesocarp slender, elongate and often running the entire length of the seed, the exocarp appearing lineolate when dry.
         11. Rachillæ 6-15 cm. long with 12-25 flowering nodes: fruit 11-19 mm. long: stamens ca. 24 (?). Viti Levu, ?Ovalau.....8. *V. vitiensis*

11. Rachillæ short, stiff, divaricate, not exceeding 7 cm. and averaging 2.5 cm. in length with 5-8 flowering nodes: fruit 18-19 mm. long: stamens ca. 28. Kandavu ..... 9. *V. Smithii*

10. Outermost fibers of the mesocarp short, thickened, and at least partially included in the exocarp which appears pebbled when dry. Vanua Levu.

12. Panicle glabrous at anthesis, at least on the major axes; stamens 30-35: fruit ca. 13 mm. long ..... 12. *V. pedionoma*

12. Panicle persistently and minutely brown-lepidote at least where protected on the major axes; stamens 40-48: fruit 18-22 cm. long.

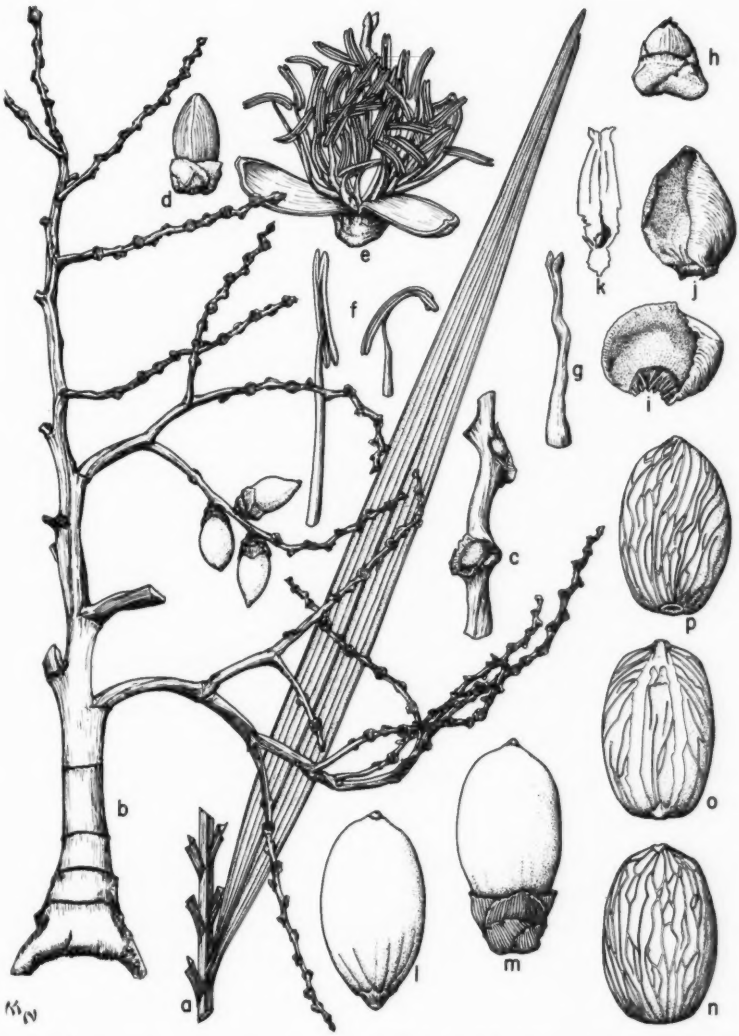
13. Pinnæ not widely separated nor reflexed near the base nor (apparently) with persistent loræ on the lowermost; apex of the leaf-rachis lax but not arcuately recurved, the petiole more than 25 cm. long: deltoid apex of petals prominent in fruit ..... 10. *V. petiolata*

13. Pinnæ widely separated and more or less reflexed or pendulous near the base, the lowermost often with persistent chlorophyllous loræ 1-2 m. long; apex of the leaf-rachis strongly arcuate-recurved: valvate apex of the petals equalled or exceeded in height and much exceeded in width by the lateral margins in fruit ..... 11. *V. sessilifolia*

† 1. **Veitchia Montgomeryana,** spec. nov. Fig. 141.

Pinnæ foliorum subtus pallido-lepidotæ panicula fere ad nodos omnes flores femineos gerens florum masculinorum stamina 130-140 fructus (3.9-) 4.5-4.6 cm. longus (1.8-) 2.4 cm. in diametro endospermum non ruminatum.

Trunk slender, gray-lepidote becoming brown and striate, with elongate internodes and prominent nodes, to 12 m. or more high, 20 cm. in diameter but often enlarged at the base: leaves 9-10 in a rather stiffly ascending crown above a crownshaft 1-1.25 m. long, the sheaths bright green with a dense indument of gray deciduous-floccose scales having persistent shining-brown appressed-stellate bases and densely vestite with twisted bright and ferrugineous to dull and dark brown basifixed chaffy scales at the junction of sheath and petiole; petiole 25-26 cm. long, gray and rounded below, orange-tinged and concave above, at first densely vestite with appressed scales having deciduous white subacicular margins from persistent brown substellate bases, at length becoming merely brown-puncticulate on both surfaces but patches of complete scales remaining where not exposed; rachis 2.3-2.6 m. long, at first densely lepidote with appressed scales having a deciduous acicular white margin from a brown stellate base, at length merely densely brown-puncticulate except where protected along the margins beneath, elongate twisted chaffy scales present, especially above, when young but frequently not persistent; pinnæ dull dark green, 50-60 on each side of the rachis, stiffish, held nearly horizontally to subpendulous from the rachis and evenly distributed at intervals of 2-4.5 cm. except for a few pairs at the base which are 7.5-10 cm. apart, linear-elliptic in outline, tapering to a very narrow, oblique, 2-toothed, often frayed apex with upper side longest and to a narrow strongly reduplicate base about 2 cm. long on the rachis, the lower margin nearly straight, the upper curving away from the rachis in a wider angle, midrib stout, keeled and about 1 mm. high above, rather prominent below where clothed basally with twisted basifixed or subbasifixed chaffy brown scales to 7 mm. long, these also present on lateral nerves, marginal



141. VEITCHIA MONTGOMERYANA. a, pinna ×1/5; b, panicle ×1/4; c, portion of rachilla showing bracteoles and flower scars ×1; d, staminate bud ×1; e, staminate flower expanded ×2; f, stamens fresh and dried ×3; g, pistillode ×2; h, pistillate flower at anthesis ×1; i, j, sepal and petal of pistillate flower ×2; k, pistil in vertical section ×2; l, m, fruit ×2/3; n-p, seed, n, antirapheal, o, rapheal, p, lateral views ×1: a, d, e, g, from *Furtado 30930*, remainder from *Moore 6816, 7056*.

nerves thickened and densely brown-punctículate, the remaining nerves of two or more orders, 1-2 of these on each side of the midrib stouter than the numerous tertiary and quaternary nerves, upper surface of pinnæ glabrous, lower densely lepidote with minute, persistent, pale, brown-centered scales, lowermost pinnæ to 50 cm. long, 2.6 cm. wide, acute to attenuate with remains of loræ sometimes to 1 m. long, median pinnæ to 80 cm. long, 5.5-7 cm. wide, subapical pinnæ to 52 cm. long, 2.5 cm. wide, apical to 32 cm. long, 1.5 cm. wide: panicle to 60 cm. long, 80 cm. wide, stout, stiff, pale, sharply angled, glabrous or essentially so at anthesis but minutely brown-punctículate or -lepidote especially on the primary axes, suberect at anthesis then spreading and bearing about 15 branches laterally and ventrally, the lower 4-5 once-branched or rarely twice-branched through forking of rachillæ, the remainder unbranched, the ultimate rachillæ 13-25 cm. long, abruptly narrowed to a slender point supporting a ♂ flower, bearing flowers in triads of ♂ ♀ ♂ throughout or nearly throughout but where the ♀ aborted then the ♂ paired; peduncle 15 cm. long, narrow and thick at the base, outer bract inserted ca. 3.5 cm. above base, inner at an interval of 2 cm. with scars of 2-3 incomplete bracts above, the rachis to 50 cm. long; staminate flowers glabrous, ca. 1.3 mm. long, 7 mm. in diameter, the sepals 5 mm. high, minutely ciliate on lower margins, pale margined, petals rather prominently striate when dry, stamens 130-140, the filaments united basally and adnate to the petals for ca. 2 mm., then distinct, ca. 4 mm. long, shorter than the narrowly linear apically and basally bifid anthers; pistillate flowers subglobose, 10 mm. high, 10 mm. in diameter, sepals 6-7 mm. high, pale margined, petals ca. 8 mm. high, strongly striate when dry, very shortly valvate-umbonate at apex, pistil narrowly ovoid, 8 mm. high, the short soft ovarial portion capped with a thickened style and 3 short divergent stigmas: fruit oblong-obovate, (3.9-) 4.5-4.6 cm. long, (1.8-) 2.4 cm. in diameter, gradually tapered to the base where subtended by an indurate closely cupular perianth of strongly striate petals 1.4 cm. long, and sepals 7 mm. long, broadest at or above the middle and abruptly narrowed to a short stylar cap 2 mm. long, exocarp smooth, red when mature, mesocarp ca. 1 mm. thick, endocarp thin, fragile and more or less adherent to the oblong-ellipsoid seed which is rounded with a very short point at the apex, (2.4-) 2.8 cm. long, (1.3-) 1.8 cm. in diameter, with coarse vascular strands descending from the raphe and loosely anastamosed, endosperm homogeneous.

Cultivated. United States: Florida; Montgomery collection, Coconut Grove, February, 1954, *Moore 6816* (BH syntype), February 26, 1955, *7056* (BH syntype), March, 1957, *7481* (BH paratype); Fairchild Tropical Garden, Coconut Grove, March, 1957, *Moore 7441*, *7446* (BH). Indonesia: Java; Buitenzorg as Gardens no. XIII.A.22, April-May, 1936, *C. X. Furtado Singapore Field Number 30930* (A, BH, BRI, L).

Plants of *Veitchia Montgomeryana* have been cultivated for many years under the name *V. Joannis* in various botanical gardens and private collections. The first records I have seen are specimens collected at the

Botanical Garden, Bogor [Buitenzorg], by Furtado who noted that the catalogue of the garden originally listed them as from the Congo. Origin of the species is unknown but is surely not African. It is more likely that the species may eventually be found native in the New Hebrides where other species similar in pinnæ, panicles, and fruit are known to occur. It is also possible that *V. Montgomeryana* may prove identical with the as yet incompletely known *V. Metiti*, yet present evidence leads me to consider it distinct. The latter appears to have pistillate flowers restricted to the lowermost nodes of shorter and much more strongly flexuous rachillæ. Fruit is nearly identical in size but the seed of *V. Metiti* has been damaged so that comparison is difficult. I had at first thought that *V. Montgomeryana* might be identical with *V. Hookeriana*. Examination of the fragmentary type kindly loaned by the Director of the Royal Botanic Gardens at Kew convinces me that they are distinct. The panicle of *V. Hookeriana* is much stiffer, appears also to have pistillate flowers restricted to the lowermost nodes, and the vascularization and shape of the seed are distinctive. *V. spiralis* differs in size, shape, and vascularization of seed, Kajewskia in the panicle and staminate flowers, *V. subglobosa* in size and shape of fruit.

Among species definitely and adequately known from the wild state, *Veitchia Macdanielsii* and *V. Winin* appear most closely related to *V. Montgomeryana*. These share the prominently pale lepidote pinnæ, the stout panicle bearing pistillate flowers nearly throughout, and the coarse vascular pattern of an oblong-ellipsoid seed. *Veitchia Winin* is amply distinct in its few stamens and small fruit; *V. Macdanielsii* approaches more closely but has smaller fruit and fewer stamens.

There should be no difficulty in distinguishing *Veitchia Montgomeryana* from *V. Joannis* in cultivation even in the vegetative state. Leaves of *V. Joannis* are borne nearly horizontally. The pinnæ are distinctly pendulous and are not pale lepidote below. Seedlings are distinctive. The first leaves are bifid with the rachis half as long to equalling the upper margin of each segment. Apices of these segments are broad and bluntly toothed. The sheath is greenish under a light cover of soft pale hairs intermixed with chaffy scales, the dark red-brown petiole is densely chaffy with spreading scales. Segments are green throughout with no orange coloring along the upper side of the chaffy green rachis which is similar to the petiole in color and scales below. *Veitchia Montgomeryana*, on the other hand, has rather stiffly ascending-arcuate leaves with pinnæ held rather stiffly from the rachis at first, dropping toward the tips. The lower surface is densely and minutely pale lepidote. Leaves of seedlings are deeply bifid at the apex, the upper margin of the segments being more than twice as long as the rachis, and the narrowed apex is sharply toothed. The sheath is reddish with floccose scales, the petiole green or tinged

with pink or orange and blotched with massed appressed gray scales, these seldom loose and chaffy. Segments are orange where attached to the orangish rachis which is blotched below. Although petioles of older seedling leaves become nearly mahogany-colored, they are still distinguishable by the blotches of gray scales. The minute lepides on the lower surface of the leaves are not obvious until the fourth or fifth leaf appears.

I have chosen as type for this species two collections taken from one of five trees grown from seed from Singapore Botanic Garden in the palm collection of the late Colonel Robert H. Montgomery whose name so richly deserves to be associated with a member of the family. His own collection and his interest in the Fairchild Tropical Garden have stimulated others to grow palms and have provided the means for much effective botanical study. Other trees are now at the Fairchild Tropical Garden and seedlings have been distributed from there in the past two years. The species seems particularly well adapted to Florida conditions. Plants growing in the garden of Mr. and Mrs. F. V. Crane at Marathon on Key Vaca have demonstrated their ability to withstand sun, wind, and salt spray that have done considerable damage to such related genera as Ptychosperma. As an ornamental subject for suitable regions, *V. Montgomeryana* should receive far wider attention.

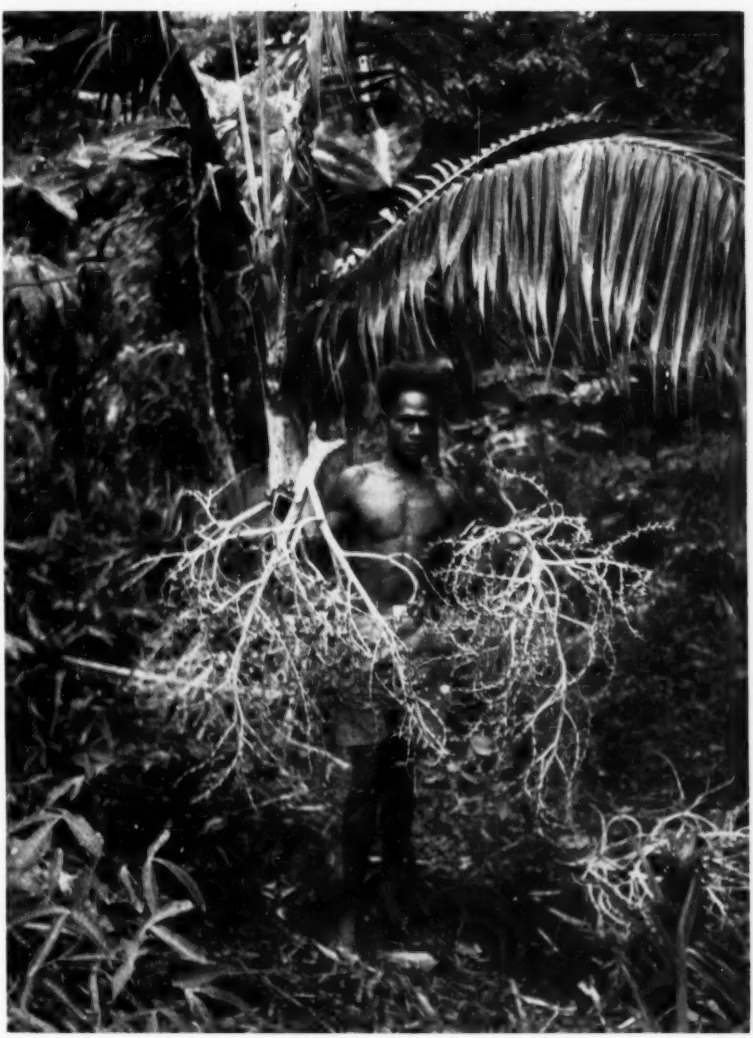
Occasional depauperate panicles appear on old or weak trees. There is some variation in fruit and seed perhaps associated with the foregoing. That illustrated in Fig. 141 is probably normal, the fruit measuring 4.6 cm. long, 2.4 cm. in diameter, the seed 2.8 cm. long, 1.8 cm. in diameter. Other mature fruits from a second tree in the Montgomery collection measure 3.9-4.1 cm. long, 1.8-2.0 cm. in diameter with seed 2.4 cm. long, 1.3 cm. in diameter. Fruit of the Furtado collection is immature and intermediate between the above two. A single weathered fruit from the Botanic Gardens, Rabaul, without data in the herbarium at Brisbane measures 4.5 cm. long, 2.2 cm. in diameter and may belong here as may specimens with immature fruit collected in cultivation at Alofi on Niue Island by T. G. Yuncker (*10141* UC, US, *10179* BH) and cited as *V. Joannis* in The Flora of Niue Island (Bernice P. Bishop Mus. Bull. 178, 27, 1943).

† 2. **Veitchia Macdanielsii,** spec. nov. Figs. 140, 142.

Pinnæ foliorum subtus pallido-lepidotæ panicula fere ad nodos omnem flores femineos gerens florum masculorum stamina ca. 100 fructus 3.3-3.5 cm. longus 1.7-1.9 cm. in diametro endospermum non ruminatum.

Trunk smooth, 25 m. high, 3 dm. base diameter, 1.5 dm. diameter at top: leaves 4 m. long; sheath ca. 1 m. long, densely pale lepidote-tomentose

(ex photo); petiole short, the fragment seen 1 dm. long, densely white-lepidote-tomentose above and below with scattered brown scales below; rachis rounded and lepidote-tomentose to glabrate but puncticulate with



142. VEITCHIA MACDANIELSII. Native assistant holding fruiting (left) and flowering (right) panicles with crown of felled tree behind. Photograph by L. H. MacDaniels.

brown scale-bases below, slightly concave to angled and more conspicuously but minutely scaly above; pinnæ ca. 55 on each side of the rachis, regularly disposed in one plane at intervals of 3.5-7 cm., the basal pinnæ not widely separated nor strongly reflexed and hanging, the lowermost 9 mm. long at insertion on the rachis, 2.5 cm. wide at middle, and directed forward at the base but in life abruptly twisted to form a nearly 90° angle with the rachis, arching toward the middle then more or less pendulous, tapered to slender acuminate tip and portion of rein, glabrous above except for minute brown scales on midnerve, lepidote-tomentose on surface and densely pale lepidote-tomentose on thick marginal veins but in age merely brown-puncticulate below and with twisted castaneous basifixed or medifixed scales on midvein, the surface and secondary nerves below very densely and minutely pale lepidote, median pinnæ similar but lacking loræ, brown-scaly on primary nerves and surface below, 2-2.2 cm. wide at insertion, 5.5-7.2 cm. wide at middle, 1-1.05 m. long, tapered to an almost acuminate, shortly and obliquely toothed tip, upper pinnæ similar but smaller, 1.9 cm. at insertion, 5 cm. wide at middle, 7-8 dm. long, apex shortly bifid, terminal pinnæ 3.5 dm. long, 1.6-1.8 cm. wide, acuminate and bifid, the rachis prolonged in a filament 15 cm. long: panicle ca. 1.2 m. long, much ramified, whitish in flower and in fruit, to 1 m. long or more, subtended by ancipitous, pale lepidote-tomentose bracts, the outer 6.7 dm. long, 1.23 dm. wide, peduncle stout, 11. cm. to first branch, 7 cm. wide at scar of outer bract, rachis with 8-10 primary branches, these again once- to twice-branched and densely pale lepidote-tomentose becoming glabrate and brown-punctate or completely glabrous in age, ultimate rachillæ of fruiting panicle 1.8-2.5 dm. long, 5 mm. thick; flowers borne in triads of ♂ ♀ ♂ in a loose spiral nearly throughout the panicle, the rachillæ with paired or solitary ♂ flowers in the ultimate 8-10 nodes; staminate flowers 15 mm. long, calyx 7 mm. diameter, 5-6 mm. high, petals 13 mm. long, 5 mm. wide, stamens ca. 100, filaments 3-4 mm. long, anthers 6-8 mm. long, deeply bifid at apex and base, immature pistillate flowers 8 mm. high, 8 mm. diameter, sepals 5 mm. high, petals 7 mm. long, ovary 6 mm. high: fruit 3.3-3.5 cm. long, 1.7-1.9 cm. in diameter, bright red, ellipsoid with eccentric apical umbo 3 mm. long, perianth rather closely appressed in fruit, pale brown, 12-13 mm. high, both sepals and petals dark brown and somewhat crenulate along the margin, the sepals 6 mm. high, petals 12-13 mm. high, staminodes 6 or fewer by union, prominent, exocarp smooth, mesocarp about 2 mm. thick, densely fibrous, endocarp thin, fragile, crustaceous; seed oblong-ellipsoid, 1.9 cm. long, 1.3 cm. diameter, truncate at base and rounded at apex, dark brown but obscured by numerous pale anastamosing branches of the raphe descending from or near the apex, endosperm homogeneous.

New Hebrides: Espiritu Santo; in coffee plantation, left from original forest, plantation of Mr. My, December 29, 1949, *L. H. MacDaniels 9108* (BH, type).

Dr. L. H. MacDaniels, now Professor Emeritus but formerly Head of the Department of Floriculture and Ornamental Horticulture, and Chairman of the Advisory Committee of the L. H. Bailey Hortorium, at Cornell

University, collected *Veitchia Macdanielsii* and *V. Winin* during his visit to the New Hebrides in 1949.

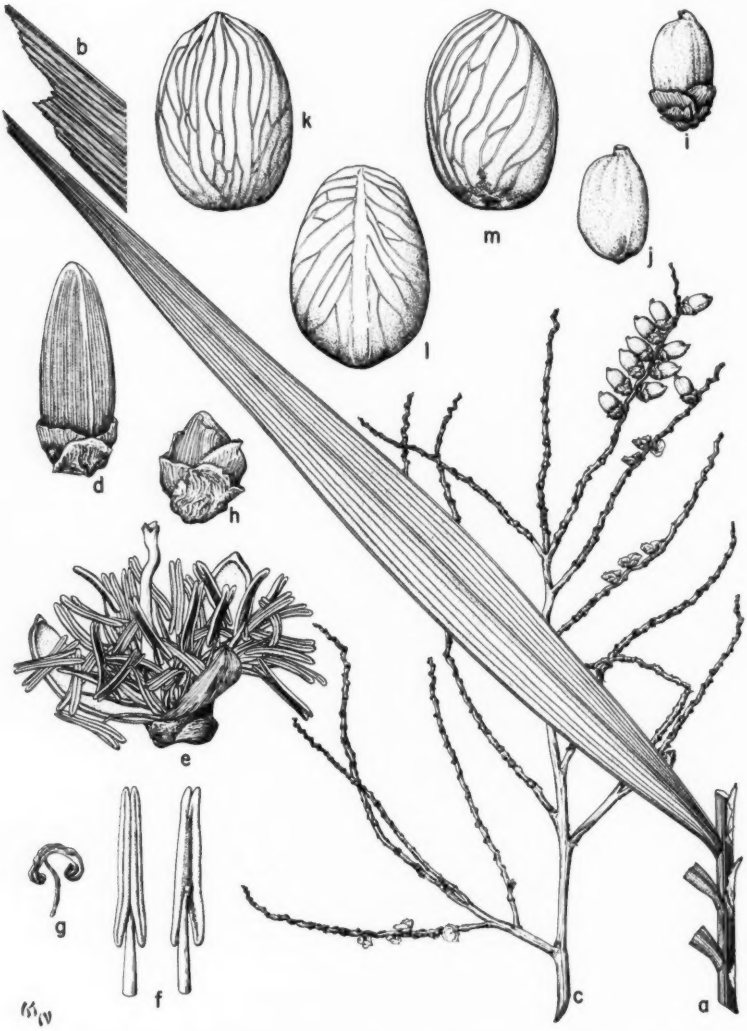
Veitchia Macdanielsii appears to be close to *V. Metiti*, Becc., but differs in the smaller fruit and apparently in the panicle. Other comparisons cannot be drawn for *V. Metiti* is known only from a partial panicle and a few fruits. The latter is a palm of the cloud zone at 1000 m. altitude on Vanua Lava while *V. Macdanielsii* is a species from coastal lowlands. Doubtless other differences will appear when *V. Metiti* is better known.

The foliage, at least when newly expanded, has a copious indument of minute pale scales below, resembling *V. Montgomeryana* in this respect. It differs from material which I assign to *V. Montgomeryana* in its small fruit with markedly eccentric stylar cap, in the small seed and in fewer stamens.

† 3. **Veitchia Winin,** spec. nov. Figs. 139, 143.

Pinnæ foliorum subtus pallido-lepidotæ panicula fere ad nodos omnem flores femineos gerens florum masculinorum stamina ca. 50 fructus (14-) 18-19 mm. longus, 9-10 mm. in diametro endospermum non ruminatum.

Large palm, to 20 m. or more high, 17 cm. or more DBH; trunk enlarged at the base (in cultivation), at first densely gray-lepidote then brown: leaves 8-10, 3 m. long, 1.6 m. wide, the sheath 9.7 dm. long, green at base, densely pale lepidote-tomentose above, the scales with deciduous matted white-hairy margins from persistent brown bases, densely clothed with dull deep red-brown twisted membranaceous scales at apex; petiole 2.3-2.8 dm. long, very deep red-brown, densely pale lepidote-tomentose on both sides, slightly concave above, rounded and clothed with dense to scattered dull brown twisted scales below, becoming glabrate and densely brown-punctículate when denuded, rachis rounded and lepidote-tomentose to glabrate and brown-punctículate below, angled and at length brown-punctículate above; pinnæ 46-48 on each side of the rachis, regularly disposed at intervals of 2-5 (-9) cm., the lowermost 1.3-1.5 cm. wide and strongly reduplicate at insertion on rachis, 6.5-7 cm. wide at middle, 41-73.5 cm. long, narrowed to slender tip with blunt vestige of rein, glabrous above, with few brown scales on midvein, minutely deciduous pale lepidote on nerves and lepidote-tomentose or glabrous in age on thickened marginal nerves below, the next borne 9 cm. above, similar but the apex very obliquely toothed and ca. 3 cm. wide, the base more densely clothed with scales on the nerves and floccose but soon glabrous on the surface below; median segments 65-75 cm. long, 1.3-2.8 cm. at insertion, 7.5-11 cm. wide at middle, tapered to oblique toothed apex ca. 4.5 cm. wide, slightly floccose and scaly at base below, glabrous toward apex and above except the marginal nerves, subapical segments 44.5-57 cm. long, 4.5-8.8 cm. wide at middle, 3.5 cm. at apex, apical segments ca. 20.5 cm. long, 5.5-6 cm. along the rachis, 8.2 cm. wide at middle, 4.3 cm. wide at apex: bracts densely white-floccose-tomentose, the outer bract ca. 45 cm. long, 13.9 cm. wide, the inner ca. 43 cm. long, 9.5 cm. wide inserted ca. 3 cm. above outer and 6 cm. from base: panicles ca. 5, to 8.5 dm. long or more, 10 dm. wide, essentially glabrous or punctículate except the densely



143. VEITCHIA WININ. a, pinna ×1/5; b, tip of pinna ×1; c, branch of panicle ×1/3; d, e, staminate flowers in bud and expanded ×3; f, g, anthers fresh and dried ×5; h, pistillate bud ×3; i, j, fruit ×1; k-m, seed, k, antirapheal, l, rapheal, m, lateral views ×3: all except e, f, from type, e, f, from *Moore 7440*.

white-lepidote-tomentose peduncle ca. 15 cm. long, whitish, 3-4 times branched, ultimate rachillæ 8-20 cm. long, the flowers in triads of ♂ ♀ ♂ nearly throughout or paired ♂♂ in apical 2-4 cm.; staminate flowers 10-11 mm. long, the calyx 4 mm. diameter, 3 mm. high, petals 9-10 mm. long, 3.5 mm. wide, stamens ca. 50 about equalling petals, filaments 4 mm. long, anthers 4 mm. long, bifid at base and apex, pistillode attenuate, 8 mm. long; immature pistillate flowers 5.5 mm. high, 4.5 mm. diameter, sepals 3.5 mm. high, petals 5 mm. high, briefly valvate-umbonate at apex, staminodes united into 3, pistil 4 mm. high: fruit (14-) 18-19 mm. long, 9-10 mm. diameter, with eccentrically apical umbo 1 mm. long, fruiting perianth 8 mm. high, the petals about twice as long as sepals, exocarp smooth, red, mesocarp strongly fibrous, endocarp thin, fragile, crustaceous, not adherent to seed; seed ovoid with truncate base, 10 mm. long, 7 mm. diameter, dark brown, the raphe as long as seed, with pale vascular branches ascending from apex and sides in parallel and anastamosing slightly on back, endosperm homogeneous.

New Hebrides: Malekolo Island, opposite Atchin Island, alt. ca. 50 m., December, 1949, *L. H. MacDaniels 3093* (BH, type); occasional in forest, left in cultivation, Le Fabre plantation, alt. ca. 10 m., December 23, 1949, *L. H. MacDaniels 3076* (BH).

Cultivated. United States: Florida; Fairchild Tropical Garden, Coconut Grove, March, 1957, *Moore 7440* (BH).

According to the collector, this species is abundant in the forest on Malekolo Island, where it is known as "Winin." Seed from a tree cut at the Le Fabre plantation was sent to the Fairchild Tropical Garden where a fruiting tree has a trunk now 3 m. high. The panicles on this tree have shorter rachillæ than those of specimens from the wild state and fruit is as little as 14 mm. long. *Veitchia Winin* excels as a cultivated palm. The deep green rather stiffish foliage, pale crownshaft, and masses of whitish flowers followed by an abundance of bright red fruit are highly ornamental. The species is not demanding culturally and commences to fruit after four to six years.

† 4. **Veitchia Merrillii,** (Becc.) trans. nov. Figs. 144, 145, 146, 147.

Normanbya Merrillii, Becc. in Phil. Journ. Sci. iv, 606, pl. 30, 31 (1909); Merr. in Phil. Bur. Sci. Publ. v, 127 (1912); Becc. in Elmer, Leaflets Phil. Bot. viii, 3009 (1919).

Adonidia Merrillii, (Becc.) Becc. in Phil. Journ. Sci. xiv, 329 (1919); Brown & Merr. in Phil. For. Bur. Bull. xviii, 15, pl. 2,3 (1919) and xxii, 139, pl. 2,3 (1920); Bailey, in Gent. Herb. iii, 435, figs. 251-253 (1935); Fairchild, in Fairchild Trop. Gard. Occ. Paper, i, 1-5 (1938); Becc. & Pichi-Sermolli, in Webbia, xi, 65, fig. 13 (1955).

Actinorhytis calapparia, Vidal, Syn. Atlas, 42, t. 94, fig. B (1883), not Wendl. & Drude fide Merr.

144. Veitchia Merrillii growing in the open at the Fairchild Tropical Garden, showing the distinctive crown, narrow internodes, and hanging lorœ. Photograph from kodachrome by G. H. M. Lawrence.

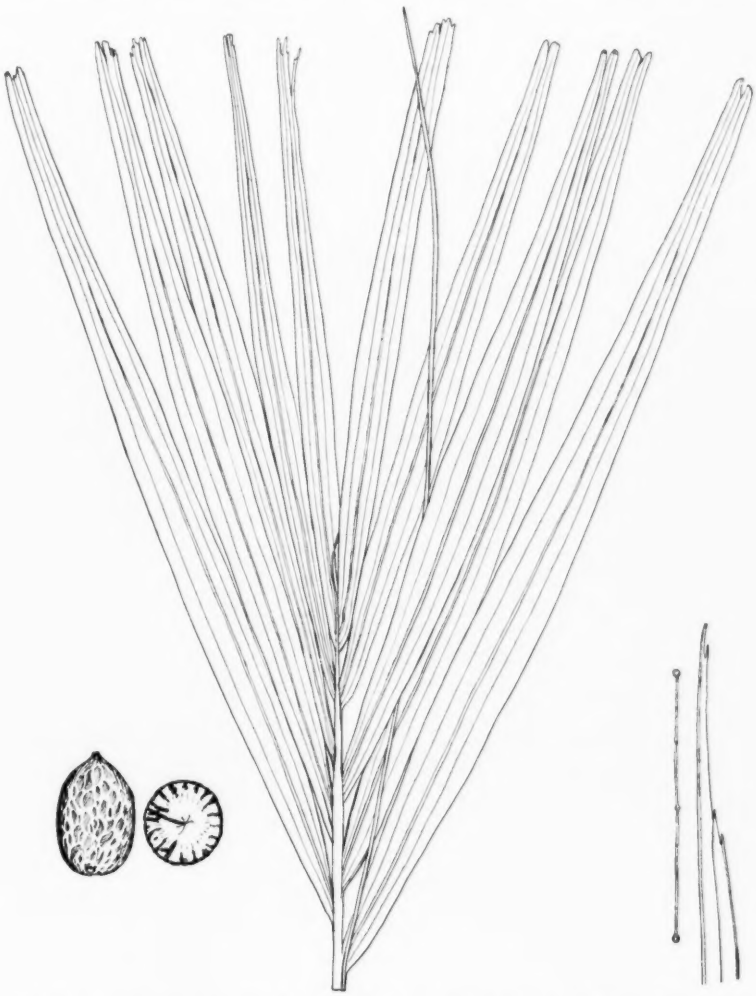
Trunk to 5 m. high or more, thickened and 22-26 cm. in diameter at the base, uniform and to 16 cm. in diameter above, the internodes very narrow when grown in full sun, or to 5 cm. high when grown in the shade, the youngest internodes green but densely gray-lepidote, becoming brown and glabrous in age: leaves (12-) 14-15; sheath 5-10 dm. long, green with a loose indument of deciduous pale floccose scales throughout and chaffy brown scales at the apex beside the base of the petiole; petiole short, 10-15 cm. long, 4-6 cm. wide, the rachis 1.75-2 m. long, ascending in young trees, at maturity spreading and strongly arcuate-recurved at the tip with ascending pinnæ when grown in full sun or nearly straight with spreading pinnæ when grown in the shade, pinnæ (40-) 48-63 on each side of the rachis, regularly disposed at intervals of 2-4 cm. along the rachis, dull dark green above and paler below where densely minutely and persistently pale lepidote, the lepides with brown centers, the midnerve with few chaffy brown

145. VEITCHIA MERRILLII in various stages of flower and fruit growing in the Canal Zone, Panama. Reprinted from Gentes Herbarum, iii, 432, fig. 251 (1935).

scales near the base, lowermost pinnæ bifd at the apex with the upper margin continued in more or less persistent loræ, 39-43 cm. long, 1-1.6 cm. at insertion on the rachis, 1.4-1.5 cm. wide at the middle, 0.4 cm. wide at the apex, the median pinnæ 57-75 cm. long, 1.2-1.3 cm. at insertion on the rachis, 4-5 cm. wide at the middle, 0.9-1.1 cm. wide at the obliquely toothed apex, subapical pinnæ shortly bifid, 35-45 cm. long, 1-1.1 cm. at insertion on the rachis, 2.1-2.4 cm. wide at the middle, 0.9 cm. wide at apex, the apical pinnæ 25-33 cm. long, 1.6 cm. wide, the apex narrowed and truncate or shortly bifid: panicles generally 3-5, spreading or, in fruit, subpendulous, dull white, white-floccose when young but soon glabrous except for pale scales on the short peduncle, 40-50 cm. long and broad, the lower branches twice-branched, to 30 cm. long, the median once-branched, the apical simple, ultimate rachillæ short, stiff, rather strongly flexuous toward

146. Veitchia Merrillii. Fruit nearly natural size grown at the Atkins Garden and Research Laboratory of Harvard University in Cuba. Reprinted from Gentes Herbarum, iii, 433, fig. 252 (1935).

the tip, (3-) 4.5-11 cm. long with 10-20 flowering nodes, the lower half bearing triads of ♂ ♀ ♂ flowers, the upper half with paired or solitary staminate flowers; staminate flowers greenish-white, 10-12 mm. long, 7 mm. in diameter in bud, the sepals ca. 3 mm. high, petals lineolate at maturity, stamens



147. VEITCHIA MERRILLII. Tip of new leaf ×1/2, with tip of lateral pinna ×1/2, cross-section of same ×1, and seed in lateral view and cross section ×1. Reprinted from Gentes Herbarum, iii, 434, fig. 253 (1935).

47-62, the filaments 3-6 mm. long, anthers 3-6 mm. long, acute to emarginate; pistillate flowers globose-conical, ca. 6 mm. long in bud, the petals with a short valvate apex, staminodes 6, united in a short cup basally, the perianth enlarged in fruit forming a yellowish sheathing cupule ca. 16 mm. broad, 11 mm. high, the sepals 4-6 mm. long, petals 11-12 mm. long: fruit bright crimson, 2.7-3.3 cm. long, 1.7-2 cm. in diameter, the stylar cap almost exactly apical, mesocarp with orange flesh and pale fibers, endocarp thin, crustaceous or subpergamentaceous, not adherent to the seed, seed 1.5-2 cm. long, 1.3-1.4 mm. in diameter, rounded at both ends, the vascular branches much anastamosed and impressed, endosperm deeply ruminate.

Philippine Islands: Palawan and Calamianes Islands but widely cultivated in tropics of both hemispheres; type, cult. Manila, *Merrill:* Palawan Group; Palawan Island, Brooks Point (Addison Peak), March, 1911, *Elmer 12708* (US); Apulet Island, Taytay Bay, May, 1913, *Merrill 8415* (US).

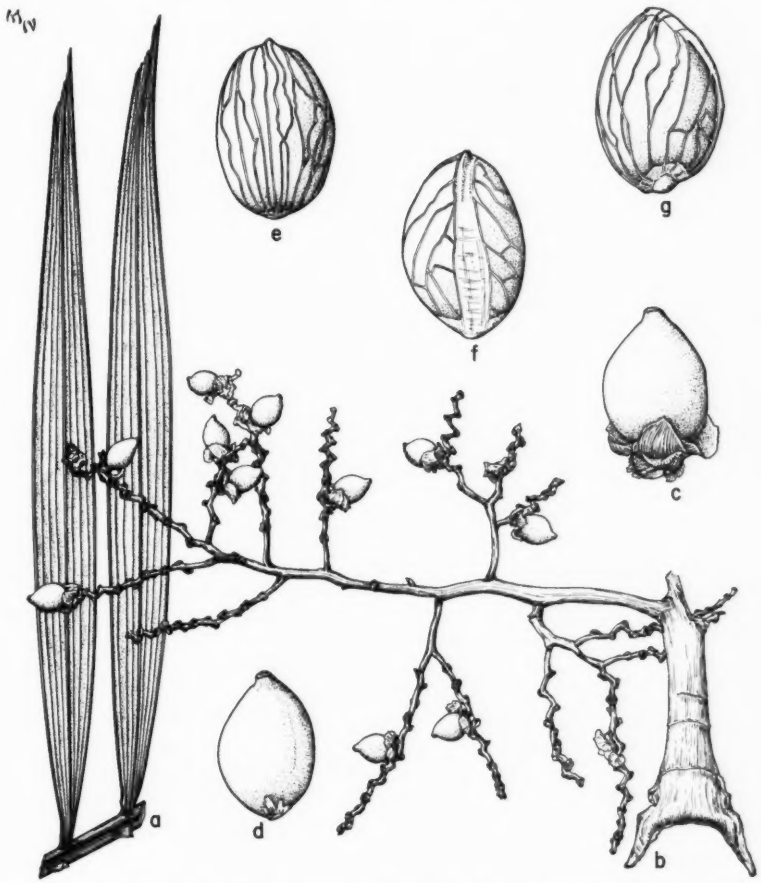
Cultivated. Philippine Islands, Luzon; Manila 1893, *Loher 1354* (US); Manila, *Merrill s.n.* (FI, type, photo BH neg. 6512). Marianas Islands, Guam; Umatac, January 12, 1954, *Fosberg 35446* (BH). Hawaiian Islands, Oahu; Kamehameha Girls' School, October 10, 1938, *A. F. Judd s.n.* (BH). Panamá, Canal Zone; Experimental Gardens, Summit, July 1, 1931, *L. H. & E. Z. Bailey 431* (BH). Cuba, Atkins Garden and Research Laboratory of Harvard University, Soledad, Cienfuegos, December, 1933, *F. G. Walsingham s.n.* (BH) and November 15, 1934 (BH); February 26, 1952, *Moore 6103* (BH). United States: Florida; Coconut Grove, Montgomery Collection, March 29, 1951, *Moore 5848* (BH); February 25, 1942, *G. H. M. Lawrence 11* (BH); March, 1952, *Moore s.n.* (BH); Bradenton, August 14, 1935, *L. H. Bailey 85* (BH, photographs only).

† 5. **Veitchia simulans,** spec. nov. Fig. 148.

Pinnæ foliorum subtus fusco-lepidotæ panicula fere ad nodos omnem flores femineos gerens fructus 21-22 cm. longus 12-13 mm. in diametro endospermum non ruminatum.

Stem ca. 5 m. high: leaves 2-3 m. long; petiole 20-25 cm. long, 4 cm. broad at the base, apex of sheath, lower surface of petiole and rachis everywhere densely lepidote with appressed small scales and rather few narrow twisted erect castaneous scales near the margins, the appressed scales with persistent brown bases, flattened subpersistent brown membranous center and deciduous interlocking pale acicular-laciniate margins, above more or less concave with twisted castaneous scales near the sharp margins and an appressed epidermis-like cover of red-brown membranous

scales, these lacking pale marginal acicular hairs and eventually apparently breaking into short more or less erect scales similar to those on the margin; rachis with indument similar to that of the petiole; pinnæ 15-20 on each side of the rachis, alternate to subopposite, regularly disposed at intervals of 4.5-6 cm., those at the base nearly straight and the lowermost with remnant of lora ca. 43 cm. long, ca. 36 cm. long, 2.5 cm. wide, tapering to base and apex from the middle, the base 5-6 mm. wide at insertion



148. VEITCHIA SIMULANS. a, pinnæ ×1/5; b, portion of panicle ×1/3; c, d, fruit ×1; e-g, seed, e, antirapheal, f, rapheal, g, lateral views ×2.

on the rachis, the apex narrowed and strongly oblique without prominent teeth other than the midpoint, median pinnæ slightly sigmoid, 61 cm. long, 1 cm. across at point of insertion, 5 cm. wide at middle, 1.8 cm. wide at tip, the finely toothed oblique margin 4.7 cm. long, mid- and marginal nerves prominent with 3-5 rather prominent secondary nerves on each side and several irregularly disposed finer tertiary nerves, all or most of the nerves minutely red-brown-lepidote below, the marginal nerves densely so, and the midrib with very slender tightly twisted basifixed castaneous scales to 8 mm. long near the base, subapical pinnæ 24-34 cm. long, 2-3 cm. wide, apical pinnæ 16 cm. long on upper margin, 3-4.2 cm. wide, nearly truncate, with 2-4 primary nerves: panicle stiff, the peduncle 10 cm. long, 3.5 cm. across at scar of outer bract, only the lower branches seen, these ca. 30 cm. long, again once- or twice-branched, the ultimate rachillæ stiff, usually strongly flexuous toward the tip, 3.5-9 cm. long, 2 mm. thick, with 7-17 flowering nodes 1-5 mm. apart bearing scars of pistillate flowers or fruit to the apex; flowers not seen: fruit becoming red at maturity, 21-22 mm. long, 12-13 mm. in diameter, slightly compressed laterally with irregularly united dentiform staminodes to 4 mm. long adherent at the base, distinctly 2-crested on one side from base to a slightly eccentric apical stylar umbo 1.5-2 mm. long, subtended by 2 flattish bracteoles ca. 1 mm. wide and flaring perianth ca. 16 mm. across, the sepals dark margined and more or less crenulate, petals with lateral margins membranous and strongly ciliate, upper margin and center eciliate, brown-margined, more or less crenulate, the central valvate apex not prominent; exocarp very finely lineolate when dry, mesocarp of stout elongate fibers in one layer, endocarp thin at maturity, fragile and often transversely fractured; seed 14 mm. long, 10 mm. in diameter, ovoid with a shortly acute apex and ridged hilum, vascular strands descending from the apex and loosely anastamosed, endosperm homogeneous.

Fiji Islands: Taveuni; in dense forest, slopes of Mt. Manuka, east of Wairiki, 300-600 m. alt., August 3-14, 1953, *A. C. Smith 8158* (BH, type, US, isotype); without definite locality, *Thurston s.n.* (K).

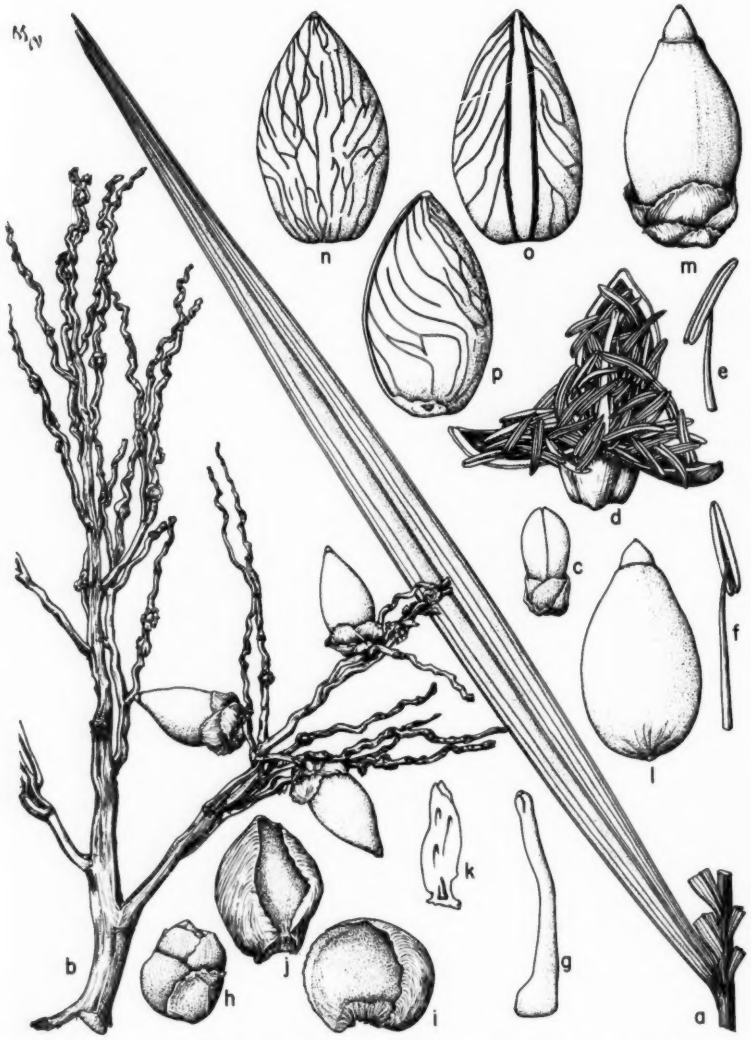
Veitchia simulans is distinctive among the better known species from Fiji Islands in the shining red-brown membranous lepides borne in abundance on the nerves below. If Beccari has correctly interpreted the specimens discussed under *V. subglobosa*, the latter is closely related to *V. simulans*, differing in larger fruit and panicle. The fruit resembles that of *V. Joannis* in miniature fashion even to the pointed seed and flaring perianth, hence the epithet chosen. It is of interest to note that the vernacular name is recorded as "Nuisawa" used elsewhere for *Veitchia Joannis* rather than "Nuiniu" which is more commonly used for the small-fruited species. Neither staminate nor pistillate flowers are known as yet. The type is in fruit and the Thurston collection cited consists only of loose fruit. It is likely that foliage resembles that of *V. Winin* and others from the New Hebrides in general aspect.

6. **Veitchia Joannis,** Wendl. in Seem. Fl. Vitiensis, 271 (1868); Gard. Chron. ser. II, 20, 205, fig. 32 (1883); Rev. Hort. lv, 344, fig. 60 (1883); Nicholson, Ill. Dict. Gard. iv, 139 (1887); Bellair & St.-Léger, Pl. Serre, 1588 (1900); Bailey, Stand. Cyclo. Hort. 3439 (1917); Becc. & Pichi-Sermolli, in Webbia, xi, 100, fig. 27 (1955). Fig. 149.

Kentia Joannis, (Wendl.) F. Muell. Fragm. vii, 101 (1870).

Kentia Fipan, Hort., in syn., Rev. Hort. lv, 206, 344 (1883).

A tall slender tree reaching a height of 32 m. in the wild state, in cultivation to 10 m. high or more, to 28 cm. diameter and uniform except for a slightly thickened base: leaves at first ascending and arching gracefully toward the tip, at length becoming nearly horizontal and curved at the tip, always with shining deep green pinnæ hanging downward at about a 45° angle; sheaths 6-12 dm. long, green, or, when exposed to the sun, yellow-green with a dense tomentum of pale or rusty floccose scales, the soft hairs deciduous from persistent brown stellate-lacerate bases which remain distinct or confluent in dark patches especially along the margins and the side opposite the petiole; petioles short, 10-23 cm. long in those measured, convex below, somewhat concave above with sharp margins, vestite above with pale scales having lacerate twisted margins deciduous from persistent brown bases that eventually give a puncticulate appearance to the petiole, vestite below with similar but denser and softer scales, these most numerous near the margins where occasional larger twisted shining dark brown subbasifixed scales to 1 mm. long are interspersed, eventually becoming puncticulate or covered with dark patches of confluent scale-bases as the softer margins disappear, petioles and rachis of expanding or newly expanded leaves very densely floccose with abundant larger twisted scales above; rachis to 3.3 m. long, at first covered above with a dense indument of pale scales having lacerate twisted margins deciduous from persistent, shining, brown, medifixed, substellate bases, at length brown-puncticulate, similarly vestite below with scales having softer hairs, these especially dense and longest persistent along the margins where occasional larger twisted shining dark brown subbasifixed scales to 1 mm. long are interspersed at least near the base of the rachis, at length brown-puncticulate with remains of a pale waxy epidermal layer; pinnæ shining dark green, 70-80 on each side of the rachis in mature leaves, evenly distributed along the rachis at intervals of 7-30 mm., linear-elliptic in outline tapering to both ends from the center, the apex narrow and oblique with the upper side longer, toothed and generally fraying into two or more slender strips, the base very narrow, strongly reduplicate and 1.5-2 cm. wide at insertion with the lower margin somewhat curved, the midrib departing at an acute angle with the rachis but somewhat curved above to form a somewhat wider angle and at this point the entire pinna becoming somewhat pendulous, midrib stout, keeled above in a sharp ridge about 1 mm. high, impressed below where clothed near the base with lacerate, twisted, dark brown, dull, basifixed or subbasifixed scales to 7 mm. long, these also present on the secondary nerves, marginal nerves thickened and brown-puncticulate, the remaining



149. Veitchia Joannis. a, pinna ×1/5; b, portion of panicle ×1/3; c, staminate bud ×1; d, staminate flower expanded ×2; e, f, stamens ×3; g, pistillode ×3; h, pistillate bud ×1, i, j, sepal and petal of pistillate flower ×2; k, pistil in vertical section ×2; l, m, fruit ×2/3; n-p, seed, n, antirapheal, o, rapheal, p, lateral views ×1.

nerves of two or more orders, 3-4 of these on each side of the midrib stouter than the numerous tertiary and quaternary nerves, upper surface of the pinnæ glabrous, lower surface minutely brown-dotted on principal nerves and toward tip with bases of minute deciduous lepides, the lowermost pinnæ 24-36 mm. long, 0.8-1.4 cm. wide, the median to 93 cm. long, 4-8 cm. wide, the subapical to 45 cm. long, 2-2.4 cm. wide, the apical to 26.5 cm. long, 2.8 cm. wide in leaves measured: panicle 50-60 cm. or more long and about as broad, stout, stiff, pale, nearly erect at anthesis when softly and densely pale or rusty or mixed floccose-tomentose but in fruit subglabrous then densely and minutely brown-punctiulate or blackish on main axes and approaching a right angle with the trunk, one-sided, bearing branches laterally and ventrally except at the very tip, the lunate base wide and shallow; bracts caducous, the outer strongly auriculate at point of insertion about 3.5 cm. above the base, ancipitous with sharp margins, bluntly bifid at the apex, densely and softly white subdeciduous floccose-tomentose, the scales with small shining brown persistent bases, the inner bract more or less rounded, inserted about 2 cm. above and included in the outer, acute, densely white-floccose-tomentose; peduncle ca. 10 cm. long, 5 cm. wide at base, dorso-ventrally compressed, bearing the scar of an incomplete third bract above the outer two, lower 3-4 branches once-branched, the several short apical branches not divided or only furcate, the ultimate rachillæ 10-20 cm. long, stiff, strongly flexuous, narrowed to a stiff sharp point which is often tipped with a ♂ flower, the lowermost 2-3 (-6) nodes bearing triads of two ♂ and a central ♀ flower, the upper with paired or usually solitary ♂; staminate flowers 1.5-1.7 cm. long, (6.5-)7-8 mm. in diameter, the sepals glabrous, 5-6 mm. high, 6-7 mm. wide, the outer keeled and all with narrow brown margins, petals not lined when dry, minutely brown-flecked, the stamens (83-) 100-110, the filaments united at the base in a triangular flat-topped mass of tissue adnate to the petals for about 3 mm., then distinct, pale, about 4 mm. long, inserted at the middle of the red-brown, linear, acute connective, the anthers linear, shortly and unequally bifid at the base, acute and entire at apex; pistillate flowers about 15 mm. high, 10 mm. diameter at anthesis, the strongly imbricate, rounded, narrowly brown-margined sepals 10 mm. high and broad, the similarly imbricate petals 13 mm. high, the innermost or the inner two with very short valvate-umbonate tips, pistil ovate-attenuate, 10 mm. high, the very short ovarial portion soft, capped with an enlarged and thickened stylar portion and 3 pale short stigmas, these papillate on the inner surface: fruit (5-) 5.3-6 cm. long, (2.2-) 2.5-3 cm. in diameter, ovate-attenuate, broadest at the very base and terminating in a palish apical stylar cap about 4 mm. long, subtended by a persistent, indurate, subcupular or usually somewhat flaring, strongly lined perianth with petals to 2.2 cm. long and wide, sepals to 1.2 cm. long, 1.8 cm. wide, both brown-margined, the staminodes yellow with brown tips, about 2 mm. high, exocarp smooth when fresh but drying minutely lineolate, orange-red when mature, thin, mesocarp strongly fibrous, ca. 2 mm. thick with interlocking pale flat fibers in several layers, the endocarp at maturity thin, yellow, fragile, horny and apparently adherent to the seed; seed ovoid, attenuate to a slender pointed apex, somewhat dorso-ventrally compressed, to 3.6 cm. long, 2.1 cm. wide, 1.9 cm. thick, the testa prophyr-colored when immature but brown at maturity,

the raphe extending the entire length of the seed with pale vascular strands descending from the apex or lateral from the raphe and loosely anastamosing, endosperm homogeneous.

Fiji Islands, cultivated as an ornamental in tropics of both hemispheres, type *Seemann s.n.* (K): without data: 1880, *Thurston s.n.* (FI, K); *Seemann s.n.* (K type, FI type, partly); February 22, 1897, *Yeoward s.n.* (K). Viti Levu; Serua, open forest Mt. Ngamo, Ngaloa, ca. 150 m. alt., April 25, 1941, *O. Degener 15102* (A, BH, K, L, MO, NY, UC, US): Tailevu; light forest, Verata Road, ca. 15 m. alt., June 28, 1955, *J. W. Parham & R. Raigiso 9166* (BH): Lau Group; Matuku, valleys and ridges in lowland and rainforest zones, 30-400 m., July 8, 1924, *E. H. Bryan, Jr. 294* (BH, K, US): Vanua Levu; Thakaundrove, southern slope of Korotini Range below Navitho Pass., 300-650 m. alt., November 21, 1933, *A. C. Smith 575* (GH, K, NY, UC, US).

Cultivated. Fiji Islands: Viti Levu; Naitasiri, Plant Introduction Station, Nanduruloulou, near Nausori, November 20, 1951, *R. Cooper s.n.* (BH). Brazil; Jardim Botanico, Rio de Janeiro, December 28, 1923, *L. H. & E. Z. Bailey 379* (BH), January 15, 1924, *591* (BH). British Guiana; Botanic Gardens, Georgetown, February 24, 1922, *L. H. Bailey 456* (BH). Bahama Islands; The Retreat, Nassau, New Providence, March 31, 1951, *Moore & M. Langlois 5862* (BH). United States: Florida; Fairchild Tropical Garden, March, 1957, *Moore 7445* (BH).

First mention of *Veitchia Joannis* appears in Bonplandia x, 192 (1862) where the fruit was described in error as that of *Kentia ?exorrhiza* [*Clinostigma exorrhiza*]. Wendland corrected the error in his account of the palms in Seemann's Flora Vitiensis, where the same fruits together with seedlings grown from seeds introduced into Europe by John Gould Veitch were described as *Veitchia Joannis*. Fruits in the carpological collection at Kew are apparently those upon which Wendland's description was based if the accompanying label is correct. These fruits measure 5.3-5.5 cm. in length, 2.7 cm. in diameter with seed 3.5 cm. long, 2 cm. in diameter. In addition, some from this collection were sent to Beccari and were illustrated in Webbia, xi, 100, fig. 27 (1955). In their length of 5.8 cm. the fruits sent Beccari are closer to the measurements given by Wendland—6 cm. in length, 3 cm. in diameter with seed 3-3.5 cm. long, 2 cm. in diameter. In general the fruits and seed accord well with the description in other respects. If additional fruits were in the possession of Wendland they would have been destroyed when the library and glasshouses of the Herrenhausen Garden at Hannover were bombed. I have, therefore, con-

sidered the fruits at Kew as the type. Their exact origin is unknown. Wendland cited the species from Moturike, Viti Levu and Ovalau.

Young plants of *Veitchia Joannis* collected by Seemann were placed in the Botanic Garden at Sydney, Australia. John Veitch introduced others into European gardens where they apparently did not persist. Seedlings of a second introduction made by C. Vuylsteke of Loochristi near Ghent, Belgium, were figured in Revue Horticole, in The Gardeners' Chronicle, in Nicholson's Illustrated Dictionary of Gardening, and in Bellair & St. Léger, Plantes de Serre. The history of plants now cultivated is obscure.

Veitchia Joannis varies, at least in the number of stamens. Fully developed staminate flowers from a Viti Levu collection (*Parham & Raigiso 9166*) have 100-110 stamens; staminate buds from Vanua Levu (*Smith 575*) have about 83 stamens; abnormal staminate flowers with an enlarged petaloid filament on one of the outer stamens from specimens at Rio de Janeiro and Nassau have 63-70 stamens but normal flowers agree with the Parham collection. A description of seedling characters appears on page 495.

It is not yet possible to present a detailed analysis of variation elsewhere in this species. Indument of the leaves varies on a single tree as seen in *Degener 15102*. Newly expanded rachis and petiole have a rather dense cover of larger castaneous scales but these are less frequent on the portions of older leaf. A similar condition exists in *Bryan 294* which, due to lack of mature fruit, is assigned here with reservation. Both white and rusty hairs occur on the panicle in *Smith 575* though in cultivated material one or the other tends to predominate.

"Niusawa" is the Fijian vernacular name for this species. Seemann stated that the wood was used for spars and the kernel, which has a slightly astringent taste, was eaten, especially by youngsters. Degener noted that leaves are used as thatch and that strips of the trunk were formerly used for making bows and arrows. The bud is eaten as a salad.

The extent to which *Veitchia Joannis* actually occurs in the Fiji Islands is difficult to determine accurately. Seemann indicated that it was found all over Fiji and perhaps in the Tonga Islands as well. I have seen no specimens from the latter group nor from the islands of Ovalau and Moturiki cited by Wendland. It is now cultivated in both hemispheres.

7. **Veitchia arecina,** Becc. in Webbia, v, 78 (1921).

Tree of moderate size (?): pinnæ from upper portion of a leaf broadly linear and very slightly sigmoid, 60 cm. long, 2.5 cm. wide, the apex obliquely truncate, sharply toothed, ca. 5 cm. long from upper margin to lower margin, mid- and marginal nerves thickened, vestite with brown scales near the base and the marginal nerves brown-punctate below, elsewhere glabrous but drying more or less pale granular below, secondary

nerves 3-4 on each side of the midrib, tertiary nerves very fine, transverse nerves indistinct: panicle with glabrous, angular, sinuous rachillæ bearing 3-4 (or more?) triads of ♂ ♀ ♂ flowers at the base, solitary ♂ flowers above; staminate flowers oblong, obtuse, 15 mm. long, 7 mm. wide, the sepals concave-saccate and acutely carinate dorsally, half as long as the oblong cymbiform petals, stamens numerous, the anthers deeply emarginate or bicornute at the apex, rather deeply bifid at the base: fruit ovate or subovate, 4.5 cm. long, 3 cm. in diameter, rather abruptly narrowed at the apex in a short, broad, obtuse conic point bearing short triangular connivent stigmas, the cupular perianth about one-fourth as long as the fruit or less, ca. 2.5 cm. across, the corolla twice as long as the calyx with rounded petals broader than high, thinly coriaceous, crenulate with scarcely an indication of an obtuse central point, fruit-coats ca. 5 mm. thick, the exocarp smooth, thin, mesocarp of uniform fibers, endocarp thin; seed subglobose 2.5 cm. long, 18 mm. in diameter, endosperm homogeneous.

New Caledonia: Puebo, *Viellard s.n.* (CN, type destroyed, fragments and sketches, FI, photo BH neg. 3372).

Beccari noted that the type, now destroyed, was incomplete but sufficient to ascertain its generic position. Fragments of the type are still extant in the Beccari collections at Firenze. I have examined a staminate bud (which measures only 5 mm. in length) and find that the pistillode is typical for the genus. Until more complete material can be obtained from New Caledonia, further description must be left in abeyance.

† 8. **Veitchia vitiensis,** (Wendl.) trans. nov.

Ptychosperma vitiense, Wendl. in Bonplandia, ix, 260 (1861), nomen as vitiensis, x, 195 (1862); in Seem. Fl. Vitiensis, 273 (1868).

Vitiphœnix vitiensis, (Wendl.) Burret, in Fedde Repert. xxiv, 284 (1928).

Trunk to 10 m. high, 20 cm. in diameter: leaves 2-4 m. long, the short petiole densely vestite, as is the rachis, with castaneous, more or less appressed, chaffy scales and minute pale margined lepides, at length becoming brown-punctate below, similarly vestite above but the castaneous scales shorter, mostly basifixed, ascending and twisted, and with longer chaffy scales infrequent on the midline above and near the margins below; pinnæ 30-40 on each side of the rachis, more or less uniformly distributed throughout the leaf and probably nearly horizontal, narrowed at the base and obliquely truncate apex from a broad middle, gradually decreasing in size and increasingly more truncate toward the apex, glabrous except for elongate red-brown twisted basifixed scales on the midnerve below and scattered minute red-brown lepides on both surfaces at the very base: panicle much ramified, glabrous, the peduncle short, lower branches twice-branched into nearly straight slender ultimate rachillæ 6-15 cm.

long with 12-25 flowering nodes in a loose spiral below becoming subdistichous above; staminate flowers with ca. 24 stamens (?); bracteoles subtending pistillate flowers and fruit 0.5 mm. wide or less: fruit 11-19 mm. long, 5-7 mm. in diameter, ovoid to ellipsoid or subglobose, subtended by a loosely cupular perianth when dry, the petals with prominently deltoid apices; exocarp drying lineolate over elongate fibers, endocarp very thin, chartaceous, adherent in whole or in part to the subglobose to ellipsoid seed, vascular strands descending from the apex and laterally from the raphe, little anastamosed except around the embryo, endosperm homogeneous.

Fiji Islands: Viti Levu, ? Ovalau.

Key to the varieties of Veitchia vitiensis

1. Fruit 18-19 mm. long; seed ellipsoid, slightly more than twice as long as broad; petals 6 mm. high and wide in fruit, the lower margins prominently ciliate ..... var. *Parhamiorum*
1. Fruit 11-14 mm. long; seed subglobose or ovoid, less than twice as long as broad; petals 4 mm. long and wide in fruit or less, the margins minutely ciliolate.
   2. Seed ovoid, 8 mm. long, 5 mm. in diameter; fruit 13-14 mm. long, 6 mm. in diameter ..... var. *vitiensis*
   2. Seed subglobose, 5.5-6 mm. high, 5 mm. in diameter; fruit 11 mm. high, 6 mm. in diameter ..... var. *microcarpa*

In 1861, two collections of Seemann, numbers 662 and 663, were bracketed together under the name *Ptychosperma vitiensis* without accompanying description. A year later, when the species was formally described, only *Seemann 662* was mentioned and only foliage was discussed. At the same time, fruit was described for *Ptychosperma filiferum*. According to Burret (Fedde Repert. xxiv, 283-284, 1928), fruits of two species were associated with *P. filiferum* in the herbarium at Berlin. One agreed with that described by Wendland for *P. filiferum* but also with fruits of *Seemann 662* associated with foliage of *P. vitiense;* others collected at Bikana without number by Seemann were pear-shaped and larger, measuring 18 mm. in length, 8 mm. in diameter. Burret drew no definite conclusions but further consideration leads to the conclusion that the larger pyriform fruits belonged to *P. filiferum* while the smaller fruits actually were those of *P. vitiense* associated with *Seemann 661* in error. The larger fruits agree essentially with those of *Veitchia sessilifolia*, a species which is certainly close to and which may prove identical with *V. filifera* when the panicle of the latter is re-collected.

The description of smaller fruit agrees with the fruit of *Seemann 662* in the Gray Herbarium and at Kew where portions of the panicle have been studied. The narrow bracteoles subtending the pistillate flowers of the latter two are typical of other material from Viti Levu, described here as varieties, characterized by the same thin adherent endocarp so well described by Wendland and by foliage indistinguishable from that of *V. vitiensis*. I have, therefore, emended the descriptions of the two species,

despite the destruction of specimens at Berlin. Unfortunately no later collections identical with *V. vitiensis* var. *vitiensis* have been seen. One collection in flower, *Smith 9099* from hills east of Navua River near Nukusere between 100 and 200 m. altitude, Serua, Viti Levu, is almost certainly referable to the species but cannot be placed varietally. It is from this material that the number of stamens was taken in the specific description.

Two other incomplete collections from Viti Levu may belong here. *Smith 8808* from the valley of Wainambua Creek south of Mt. Naitarandamu, Namosi, a dense forest at 250-350 m. altitude is in young bud. The pinnæ are larger than usual for *V. vitiensis*. *Degener and Ordonez 14765* from Vuninatambua, Navai, Tholo North at 750-900 m. altitude is in staminate flower. Stamens are 22-23 but the rachillæ do not exceed 9 cm. in length with 7-12 flowering nodes, resembling in this respect *V. Smithii* with which it had been identified.

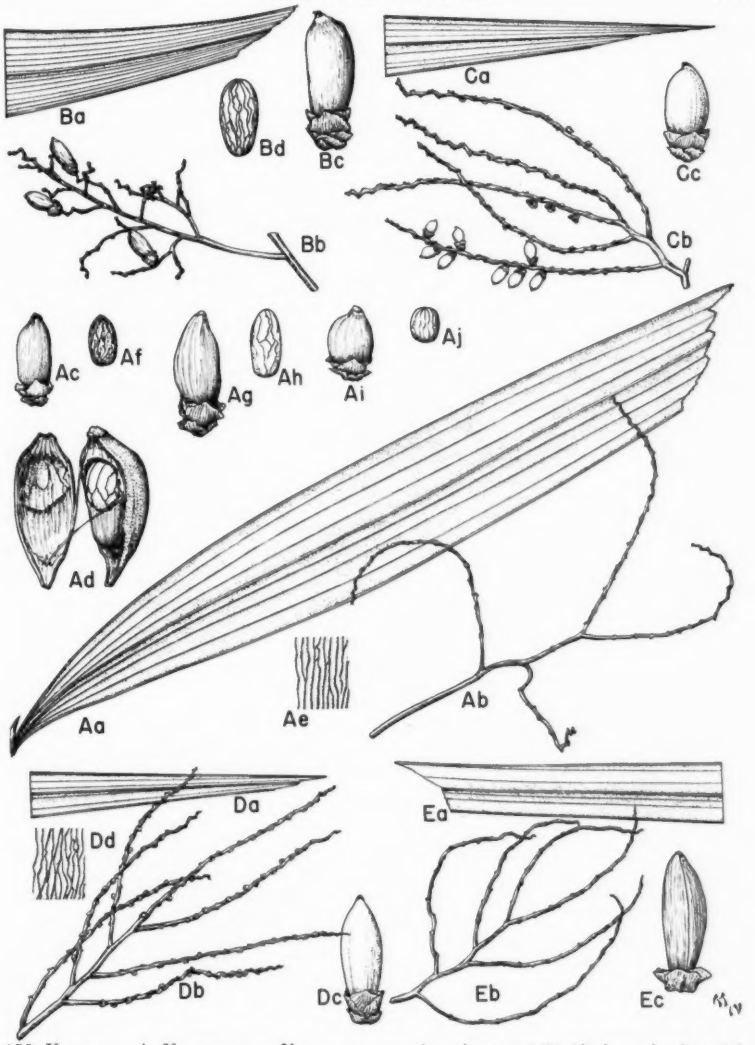
Collections in the herbaria at Leiden and Firenze from trees of unknown origin cultivated in the botanical garden at Bogor, Java, appear to represent the same species although they bear different numbers. The lineolate fruit indicates a relationship with *V. vitiensis* but is only 14 mm. long. The panicle, however, has very short rachillæ suggestive of *V. Smithii*. Since precise data on the origin of this material are lacking and I have only photographs and notes before me, further comment is left for future studies.

When collections of Veitchia from Viti Levu are sufficient for the comparison of all parts, the present circumscription of *V. vitiensis* may have to be modified. At present, fruit provides the basis for comparison. no significant differences of qualitative nature having been found in foliage or panicle. Since differences in fruit are essentially differences in size and proportion, I have recognized these at a varietal level, trusting that future collections will provide material for a more adequate and confident study.

Veitchia vitiensis var. **vitiensis.** Fig. 150 Aa-Af.

Pinnæ from near the middle of the leaf (?) 40-45 cm. long, 6-6.5 cm. wide, 6.5 cm. along the apex, secondary nerves 5-7 on each side of the midnerve, upper pinnæ smaller, the terminal pair 12 cm. long, 3-4 cm. wide, 3-nerved: ultimate rachillæ 6-11 cm. long with (13-) 18-25 flowering nodes, the bracteoles subtending the pistillate flowers ca. 0.5 mm. wide or less: fruit ovoid, 13-14 mm. long, 6 mm. in diameter, tapered to the base, shortly umbonate at the apex, the seed 8 mm. long, 5 mm. in diameter, ovoid, sepals 1.5 mm. high, 2.5 mm. wide, petals 3.5-4 mm. high, 3.5-4 mm. wide, the margins minutely ciliolate toward the base.

Viti Levu: locality not specified, 1860, *Seemann 662* with foliage (BM, lectotype), with fruit (GH, K), *663* with foliage (GH).



150. VEITCHIA. A, V. VITIENSIS: Var. VITIENSIS; Aa, pinna ×1/3; Ab, branch of panicle ×1/3; Ac, fruit ×1; Ad, fruit split to show adherent endocarp ×2; Ae, portion of outer fruit-coat ×7; Af, seed ×1; all from *Seemann 662, 663*: Var. PARHAMIORUM; Ag, fruit ×1; Ah, seed ×1: Var. MICROCARPA; Ai, fruit ×1; Aj, seed ×1. B, V. SMITHII; Ba, tip of pinna ×1/3; Bb, branch of panicle ×1/3; Bc, fruit ×1; Bd, seed ×1. C, V. PEDIONOMA; Ca, tip of pinna ×1/3; Cb, branch of panicle ×1/3; Cc, fruit ×1. D, V. PETIOLATA; Da, tip of pinna ×1/3; Db, branch of panicle ×1/3; Dc, fruit ×1; Dd, portion of outer fruit-coat ×7. E, V. PICKERINGII; Ea, tip of pinna ×1/3; Eb, branch of panicle ×1/3; Ec, staminate flower ×3; all from *Pickering s.n.*

Seemann collections have been discussed above. Since no holotype was designated, and since the only specimen with foliage that I have seen under the proper number is at the British Museum, I would designate that as lectotype.

† **Veitchia vitiensis** var. **Parhamiorum,** var. nov. Fig. 150 Ag-Ah.

Pinnæ eis var. *vitiensis* similes fructus ellipsoidalis 18 mm. longus 7-8 mm. in diametro semine 11 mm. longo 5 mm. in diametro.

Leaves ca. 2 m. long, the petiole ca. 5 cm. long, rachis 1.7 m. long; pinnæ 31-32 on each side of the rachis, the lower 6-9 cm. apart, 32 cm. long, 4.5-5 cm. wide, narrowed to 5-7 mm. at the rachis, 2.3 cm. wide at the obliquely toothed apex where 5.5 cm. long, median pinnæ 5-5.5 cm. apart, 42 cm. long, 5.5 cm. wide, 6-7 mm. on the rachis, 2.5 cm. wide at the apex, the upper 15-30 cm. long, 1.5-2.2 cm. wide, the apical 8.5 cm. long, 1.5-2.2 cm. wide, 1-2-nerved: ultimate rachillæ 12-15 cm. long with 11-20 flowering nodes; staminate flowers not known: fruit 18-19 mm. long, 6-7 mm. in diameter, ellipsoid, evenly tapered to base and shortly umbonate apex, seed ellipsoid, 11 mm. long, 5 mm. in diameter, the perianth with sepals 2.5 cm. high, 6 mm. wide, petals 6 mm. high and wide the margins prominently ciliate toward the base.

Viti Levu: Naitasiri; virgin bush off the Colo-Suva road about nine miles from Suva, August 17, 1936, *Mrs. H. B. R. Parham s.n.* (BH, type); in thick forest near Colo-i-Suva 7 miles on Tamavua-Sawani road, 200 m. alt., May 25, 1926, *Setchell & Parks 15121* (US).

This variety differs from var. *vitiensis* and var. *microcarpa* in the larger more strongly tapered fruit and larger fruiting perianth with margins prominently ciliate toward the base. The type was collected by the late Mrs. H. B. R. Parham of Suva, Fiji. Mr. B. E. Parham and Mr. J. W. Parham, the one formerly, the other presently associated with the Department of Agriculture at Suva, have been most helpful in providing information about and specimens of Fijian palms. The epithet is chosen to honor this family which has contributed in many ways to our knowledge of Fiji.

† **Veitchia vitiensis** var. **microcarpa,** var. nov. Fig. 150 Ai-Aj.

Pinnæ eis var. *vitiensis* similes fructus ovoideus 11 mm. longus 6 mm. in diametro semine subgloboso 5.5-6 mm. longo 5 mm. in diametro.

Leaves 3-4 m. long, the petiole 10-20 cm. long, pinnæ ca. 40 on each side of the rachis, the lower to ca. 50 cm. long, 4.5 cm. wide, the median to 45 cm. long, 6.2-6.5 cm. wide, 2.5 cm. wide and 5 cm. along the oblique at the apex, terminal 12 cm. long, 1.8 cm. wide: rachillæ 9-15 cm. long with 17-25 flowering nodes: fruit ovoid and rather prominently rostrate, 11 mm. long, 6 mm. in diameter, the seed subglobose, 5.5-6 mm. high, 5 mm. in diameter, the sepals 2 mm. high, 2.5 mm. wide, the petals 4 mm. high, 4.5 mm. wide, the margins minutely ciliolate toward the base.

Viti Levu: Serua; hills north of Ngaloa, in drainage of Wainingere Creek, alt. 30-100 m., November 19 - December 3, 1953, *A. C. Smith 9198* (BH, type, US, isotype).

A longer petiole, more numerous pinnæ, and small fruit distinguish var. *microcarpa* from var. *Parhamiorum*, the small fruit from var. *vitiensis*. I am least certain that future collections will not require reassessment of the disposition I have made of this material. The fruits are the smallest thus far known for the genus.

† 9. **Veitchia Smithii,** (Burret) trans. nov. Fig. 150B.

Vitiphœnix Smithii, Burret, in Bernice P. Bishop Mus. Occ. Papers, 11 (4), 7 (1935).

Stems 16 m. high: leaves 3 m. long, the sheath at first floccose-lepidote with intermixed pale and brown hairs from substellate bases, at length densely and minutely lepidote with shining red-brown substellate scales or with their persistent bases, the petiole more than 16.5 cm. long, 18 mm. wide at base, rounded-triangular and densely appressed-lepidote below and with occasional twisted castaneous larger scales near the margin, the appressed scales with persistent red-brown bases and deciduous pale acicular hairs, slightly concave near the sharp margins above and similarly vestite; rachis very densely and persistently appressed-lepidote with scales similar to those on the petiole, at length probably pale and merely brown-punctate except where protected, pale and angled above with deciduous dark brown and pale hairy scales becoming merely brown-punctate and with occasional dark brown twisted scales on the midline; pinnæ from mid-rachis alternate, regularly disposed at intervals of ca. 3 cm., 32-42 cm. long, 4.5-5.2 cm. wide, slightly sigmoid, broadest at the middle, narrowed at the base to a strongly reduplicate attachment ca. 7 mm. across the orifice, narrowed above to an obliquely truncate toothed apex 1.6-1.8 cm. wide, ca. 3.5 cm. along the oblique margin or the apical pair 2 cm. wide and 10 cm. along the margin, glabrous and glossy above, dull and glabrous below except for twisted castaneous basifixed scales on the midnerve near the base and minute brown scales or their bases on the prominent mid- and marginal nerves, secondary nerves 6-8 on each side of the midrib, prominent above and with a few fine tertiary nerves irregularly interspersed, subapical pinnæ similar but subopposite at intervals of ca. 4 cm., 15-23 cm. long, 1.9-2.5 cm. wide, the apical ca. 10 cm. long, 2.3 cm. wide, truncate: panicle 1 m. long, much ramified, glabrous, the bracts not known, peduncle 5.5 cm. long, 2.5 cm. wide at scar of outer bract, branches ca. 27, the lower stout, to 30 cm. long, 3-4 times branched, central to 18 cm. long, 2-3 times branched, subapical ca. 7 cm. long, once-branched, the terminal 7 simple and 0.7-3.5 cm. long, the ultimate rachillæ all short, 0.7-6.5 (averaging 2.5 cm.) long with 1-8 flowering nodes all of these bearing triads or the terminal 1-2 with staminate flowers only; staminate flowers (in very young bud) with ca. 28 stamens, the anthers deeply bifid at the base and apex; pistillate flowers not sufficiently developed for description: fruit (not completely mature) fibrous-lineolate

when dry, 20-22 mm. long, 7-8 mm. in diameter, obovoid, abruptly narrowed at the apex to an apical or very slightly eccentric stylar cap 1 mm. high, tapered to a slender constricted base ca. 5 mm. long, subtended by a rather closely appressed perianth 6-7 mm. high, 5-7 mm. across, the sepals 2-3 mm. high, petals not conspicuously dark margined, slightly crenulate, briefly triangular-tipped, staminodes 2-3, broadly dentiform, the bracteoles subtending the fruit 0.5 mm. wide or less, flat and inconspicuous; seed 11-12 mm. long, 5.5-6 mm. in diameter, attached along one side and seated at the top of a slender fibrous base 5 mm. high, the vascular branches descending from the apex, more or less parallel and loosely anastamosed, endosperm homogeneous.

Fiji Islands: Kandavu; hills above Namalata and Ngaloa Bays, 200-400 m. alt., October 13-18, 1933, *A. C. Smith 162* (NY, type, GH, UC, US isotypes).

Veitchia Smithii is distinguished from *V. vitiensis* chiefly by the much-ramified panicle with very short divaricate ultimate rachillæ. The fruit resembles that of *V. vitiensis* var. *Parhamiorum*. Collections discussed under *V. vitiensis*, notably *Degener and Ordonez 14765* and material from Bogor, approach *V. Smithii* in having short rachillæ. The relationship between the two species needs close study based on more ample material and field observation.

† 10. **Veitchia petiolata,** (Burret) trans. nov. Fig. 150D.

Vitiphœnix petiolata, Burret, in Bernice P. Bishop Mus. Occ. Papers, 11 (4), 8 (1935).

Stems 15-35 m. high: sheath, lower surface of petiole and of rachis dark brown furfuraceous or punctate, the petiole more than 25 cm. long; rachis lax at the tip but not markedly arcuate-reflexed; pinnæ inserted at intervals of 1.5-2 cm. apparently throughout the leaf, ca. 40 per side, directed forward at the narrow base but soon twisted and more or less stiffly horizontal from the rachis, those at the middle of the leaf 55 cm. long, 4 cm. wide, coriaceous, broadest near the middle then tapered to a finely toothed obliquely acute apex, glabrous above and below except for a line of dull brown basifixed narrowly linear twisted scales on the midrib near the base and brown-punctate margins, pinnæ progressively smaller toward the apex: panicle pedunculate, thrice-branched, minutely brown-lepidote at least on the major axes, compressed and angled, the ultimate rachillæ nearly straight or slightly flexuous bearing triads of ♂♀♂ flowers nearly throughout, 10-13 cm. long with 18-27 flowering nodes loosely spiralled below, becoming distichous or nearly so above; staminate flowers 7 mm. long, the calyx spreading when dry but appressed when wet, the sepals ca. 1.5 mm. high, 3-3.5 mm. wide, petals 6.5 mm. long, stamens 48-50, the filaments about half as long as the anthers, these 4 mm. long, acutely and deeply bifid at the apex, deeply sagittate at the base; pistillate flowers subtended by conspicuous bracteoles 0.5-1 mm. high: fruit (not completely mature) 18-19 mm. long, 6 mm. in diameter,

narrowly ellipsoid, tapered to the base and the very shortly umbonate apex, the perianth 6.5-7 mm. high, scarcely crenulate, membranous-margined, the petals with a conspicuous triangular apex; exocarp closely adherent to (and partially including ?) an underlying layer of short thickened fibers 0.5-1 mm. long, when dry appearing pebbled, seed not completely developed, rounded at the apex, endosperm homogeneous.

Fiji Islands: Vanua Levu; Mbua, southern slope of Mount Seatura, alt. 500 m., April 27-28, 1934, *A. C. Smith 1687* (NY, type, GH, UC, US, isotypes).

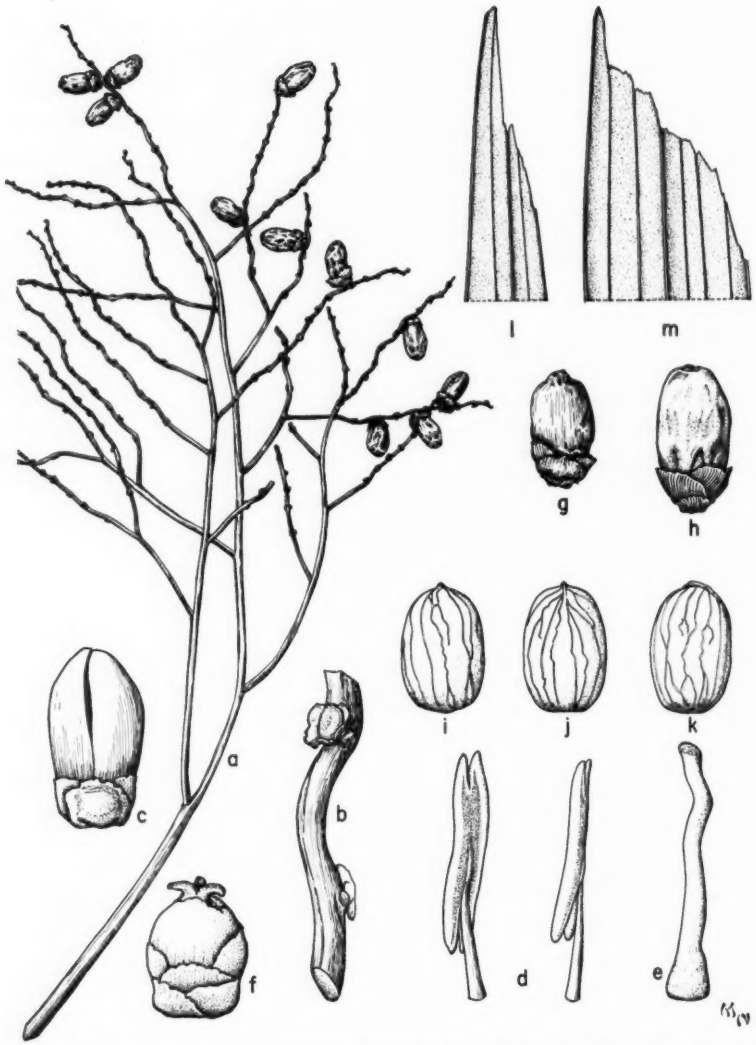
The closely placed pinnæ of *Veitchia petiolata* are more like those of *V. Joannis* than those of *V. filifera* and *V. sessilifolia*. Added differences in the fruit attest to the validity of the taxon. Although fruit from the type was forwarded to Florida with that of *V. sessilifolia*, I have seen no plants in cultivation, doubtless due to incomplete maturity of the seeds.

Burret used the spreading calyx of staminate flowers as an additional character. When flowers are boiled for dissection, this distinction disappears as the sepals assume the normal erect position. A similar circumstance is found in *V. sessilifolia* and is probably attributable to the immature stage in which they were collected.

† 11. **Veitchia sessilifolia,** (Burret) trans. nov. Fig. 151.

Vitiphœnix sessilifolia, Burret, in Bernice P. Bishop Mus. Occ. Papers, 11 (4), 9 (1935).

Trunk to 10 m. high, 11 cm. in diameter, in cultivated specimens narrowed and then abruptly thickened toward the base: leaves 6-7, erect or ascending with strongly arcuate tips, the sheath ca. 50 cm. long, 12.5 cm. in diameter, closed but soon splitting opposite the petiole, deep green with white floccose-lepidote indument outside, yellow and smooth inside; petiole 10-26 or more cm. long, to 5 cm. wide and 3 cm. thick at the base, rounded and densely canescent below with interlocking appressed acicular-margined lepides, at length becoming densely brown-punctate, canescent to glabrescent above and with castaneous twisted basifixed scales especially near the acute margins above, the rachis to 3.3 m. long, green above, rounded and gray-lepidote-tomentose when young becoming dark brown furfuraceous or brown-punctate in age below; pinnæ 46-47 on each side of the rachis borne in a single plane and regularly alternate to subopposite or the median occasionally paired, coarse, coriaceous, narrowed at the base, broadest at the middle, the apex obliquely acute to truncate, the midnerve and marginal nerves prominent on both surfaces, secondary nerves several and inconspicuous, deep green, glabrous and glossy above, glabrous and dull below except for brownish- or grayish-lepidote or -punctate marginal nerves and pale brown or grayish slender, twisted, basifixed, more or less deciduous, filiform to oblanceolate-linear scales to 9 mm. long on the midrib near the base and occasionally densely and minutely brown-lepidote on the surface about the very base, the lowermost pinnæ



151. VEITCHIA SESSILIFOLIA. a, portion of panicle in fruit ×1/3; b, portion of rachilla with bracteoles and flower-scars ×3; c, staminate flower ×3; d, stamens ×6; e, pistillode ×6; f, pistillate flower at anthesis ×3; g, h, fruits ×1; i-k, seed, i, antirapheal, j, rapheal, k, lateral views ×2; l, m, tips of pinnæ ×1: a-f, l from *Moore 6087*, g, m, from *Degener and Ordonez 14074*, h-k from *Smith 1784*.

to 1 m. long, 5 cm. wide, often with persistent chlorophyllous loræ from the tip, the lower separated at intervals of 10-15-23 cm. and more or less reflexed, to 82 cm. long, 5.8 cm. wide, narrowed to 1.5 cm. at insertion on the rachis, the median pinnæ 1.5-6 cm. apart, to 82 cm. long, 5.5 cm. wide, 1-1.5 cm. at insertion, directed forward, subapical pinnæ similar but smaller, the terminal pinnæ ca. 32 cm. long, 2-3 cm. wide, truncate and toothed at the apex, 3-5-nerved: panicles often several at successive nodes below the crownshaft, ca. 1.1 m. long, 3-4 times branched, subtended by 2 caducous ancipitous pergamentaceous densely and minutely lepidote bracts, lepidote-tomentose, especially on the major axes, when young when densely vestite with deciduous dark-brown-based pale plumose scales and persistent or subpersistent small basifixed castaneous scales, these remaining where protected even on the fruiting panicle, the peduncle straight, 15-26 cm. long, the lowest branch 1 m. long with 5-6 primary branches, these again twice- or thrice-branched, the nearly straight ultimate rachillæ 5-16 cm. long with 5-17 flowering nodes becoming distichous toward the apex, pale and minutely furfuraceous with acicular or twisted dark scales or glabrate, the terminal 10 branches smaller, once-branched or unbranched, 11-23 cm. long; staminate flowers creamy-white, 9 mm. long, 5 mm. in diameter at maturity, the calyx 3 mm. wide at the base, the margin irregularly crenulate and brown-membranous, petals 8 mm. long, 4 mm. wide, stamens 40-48, with subulate filaments about half as long as the anthers, these 5 mm. long, sagittate at the base, bifid at the apex; pistillate flowers 6.5 mm. high, 4.5 mm. in diameter at maturity subtended by prominent bracteoles, the sepals similar to those of staminate flowers but less strongly thickened at the base, petals 5 mm. high, 5 mm. wide, broadly ovate with very short valvate triangular apex 0.75 mm. long, staminodes apparently 6 but variously united into 3, pistil ovoid, ca. 5 mm. high, 3.25 mm. in diameter: fruit 18-22 mm. long, 8-11 mm. in diameter, oblong-ellipsoid, rather abruptly narrowed at the base and again to a low broad stylar cap, subtended by a rather closely sheathing light brown perianth with petals 7 mm. long, 10 mm. wide, the triangular apex of these short, exceeded in height and breadth by the adjacent margins, sepals 2 mm. long, glabrous with brown-membranous irregularly dentate upper margin and minutely ciliate lateral margins, 8 mm. across, the staminodes in an irregular ring, thin exocarp adherent to underlying shortened and somewhat thickened fibers ca. 1 mm. long and appearing pebbled or lineolate when dry, mesocarp ca. 1.5 mm. thick, endocarp crustaceous, thin, fragile, the seed ovoid, produced in a short point, 10 mm. long, 7 mm. in diameter, vascular strands descending in parallel from near the apex of the raphe and little anastamosed except at the base near the embryo, endosperm homogeneous.

Fiji Islands: Vanua Levu; Thakaundrove, Yanawai River region, Mount Kasi, 300-430 m. alt., May 10-11, 1934, *A. C. Smith 1784* (NY, type, GH, UC, US, isotypes); eastern drainage of Yanawai River, ca. 120 m. alt., January 12, 1941, *Degener & Ordonez 14074* (A, MO, NY, UC, US).

Cultivated. Cuba; Atkins Garden and Research Laboratory of Harvard University, Soledad, Cienfuegos, February 22, 1952, *Moore 6087*

(BH) and February 25, 1955, *6087 bis* (BH, US). United States: Florida; Montgomery Palmetum, Coconut Grove, March, 1957, *Moore 7448* (BH).

Seed from the type of *Veitchia sessilifolia* was forwarded to the late Colonel Robert Montgomery in Coconut Grove, Florida, by the collector in 1934. Some of it was shared with the Atkins Garden in Soledad, Cuba, where a tree flowering at a height of 2 meters was observed in 1952 and again in 1955. Another tree at the Montgomery Palmetum has not yet commenced to flower.

It is instructive to compare trees in cultivation with the type specimens. The progeny do not differ in essential qualities of habit, general proportions of foliage and panicle, indument, flowers, or fruit, but notable differences can be observed in size of leaves, toothing of the leaf apex and in panicles. The type is not complete but median pinnæ are about 50 cm. long, 5 cm. wide. Pinnæ from a comparable region in cultivated trees are slightly more than 80 cm. long, 5.5 cm. wide, and distinctly acute. Lower pinnæ are separated by 11-23 cm. on the stout rachis; those of the type are inserted 10-11 cm. apart. Burret applied the epithet *sessilifolia* because of the extremely short petiole but in cultivated plants this may be as much as 10 cm. long. The panicle also appears to be much more robust in cultivation with ultimate rachillæ 7.5-15 cm. long with 10-17 flowering nodes as opposed to rachillæ 5-9 cm. long with 7-11 flowering nodes in the type.

Emphasis has been placed on the size of parts in separating species of this complex heretofore. On that basis, the specimen collected by Degener and Ordonez would merit distinction because of the long slender petiole to 26 cm. long or more, the elongate peduncle 24-26 cm. long. I do not consider these adequate specific differences in view of the pronounced similarity in indument, flowers, and particularly in fruit. The broad rather than nearly acute tips of the pinnæ are strikingly like those of *Veitchia vitiensis* and *V. Smithii*. It is significant that a sterile tree grown at the Montgomery collection from seed of the type is similarly marked by broad apices of the pinnæ. The determining factor is unknown but it is obvious that the difference cannot be relied on for distinction within the species.

† 12. **Veitchia pedionoma,** (A. C. Smith) trans. nov. Figs. 150C, 152.

Vitiphœnix pedionoma, A. C. Smith, in Journ. Arnold Arb. xxxi, 145 (1950).

Stems to 10 m. high, 20 cm. in diameter: leaves ca. 4 m. long, the sheath elongate, petiole and rachis at first pale lepidote, then merely

brown-punctate, the petiole 40-60 cm. long, rachis 2 cm. wide at base, nearly straight for about two-thirds its length, then strongly arcuate-recurved; pinnæ ca. 50 on each side of the rachis, crowded toward the apex, tapered from the middle to a narrow base and an obliquely toothed apex (?) soon bifid or variously frayed, the lower 6-10 cm. apart and more or less reflexed, 65-75 cm. long, 4-5.5 cm. wide at the middle, the median ca. 3 cm. apart but similar, the subapical 3-4 cm. apart, shorter

152. VEITCHIA PEDIONOMA. Native assistant holding entire leaf from the type. Photograph by A. C. Smith.

and narrower, the apical ca. 20 cm. long, ca. 3.5 cm. wide, the midnerve sparsely vestite with grayish twisted basifixed scales near the base below, the marginal nerves brown-punctate, surface otherwise glabrous: panicles several, short-pedunculate, much-ramified, glabrous, ca. 60 cm. long and broad, the main axis and branches compressed and angled, the lower branches twice-branched, the median and upper once-branched to simple, the nearly straight ultimate rachillæ 10-15 cm. long with 25-30 flowering nodes in a loose spiral basally, becoming more or less distichous apically; staminate flowers 7-8 mm. long, the sepals 1.5-2 mm. high, 2.5-3.5 mm. wide, entire at anthesis, petals 6.5-7 mm. long, 2.5-3 mm. wide, stamens 30-35, the filaments about half as long as the anthers, these 4 mm. long, acutely bifid at the apex, deeply sagittate at the base; pistillate flowers 3-3.5 mm. in diameter in bud, subtended by conspicuous bracteoles 1-1.5 mm. high: fruit (not completely mature) 13 mm. high, 6 mm. in diameter, ellipsoid, obliquely and shortly rostrate, tapered to the base, the perianth 4-5 mm. high, 5-6 mm. in diameter, rather closely sheathing the base of the fruit, the margins scarcely crenulate, narrowly brown-membranous, the petals with a prominent triangular apex; exocarp adherent to short thickened fibers 0.3-0.5 mm. long appearing pebbled when dry, the incompletely formed seed rounded at base and apex, endosperm homogeneous.

Fiji Islands: Vanua Levu; Mathuata; Seangangga Plateau, in drainage of Korovuli River, vicinity of Natua, alt. 100-200 m., November 25, 1947, *A. C. Smith 6635* (A, type, US, isotype).

Veitchia pedionoma is known only from the type. Like its congeners it is known by the vernacular "Niuniu." Habit is similar to that of *V. filifera* and *V. sessilifolia*. Although the pinnæ are badly frayed at the tips, the apices appear to be obliquely truncate and toothed. The species is distinguished by its combination of elongate petiole, glabrous panicle, relatively few stamens, and small fruit which, though not completely mature, has probably reached very nearly the maximum size.

SPECIES INCOMPLETELY KNOWN

13. **Veitchia Hookeriana,** Becc. in Webbia, v, 77 (1921). Figs. 153, 154.

Habit and foliage unknown: branch of a panicle 32 cm. long, 4.5 cm. broad at base, glabrous but minutely brown-puncticulate toward ends of rachillæ, twice-branched, the rachillæ 4-11 cm. long, flattened, angled and stiff, nearly straight or becoming flexuous toward the tip, bearing triads of 2 ♂ and a central ♀ flower at the lowermost 1-2 nodes, with paired or solitary ♂ flowers above; staminate flowers (incompletely developed ?) 9 mm. long, the somewhat asymmetric petals ca. 8 mm. long, sepals 4-6 mm. long, stamens numerous with linear anthers sagittate at

the base, shortly bifid to subacute at the apex, pistillode apparently lageniform: fruit 4.5 cm. long, 2.3-2.6 cm. in diameter, ovoid with broad stylar cap ca. 3 mm. high, subtended by perianth of sepals 11-12 mm. wide, 7-8 mm. high, petals 17 mm. wide, 11-12 mm. high; seed ovoid, 2.4-2.7 cm. long, 1.8-2 cm. in diameter, rounded at the base, subacute at the apex, the vascular strands pale and very slender, descending from the apex and raphe, little anastamosed, endosperm homogeneous.

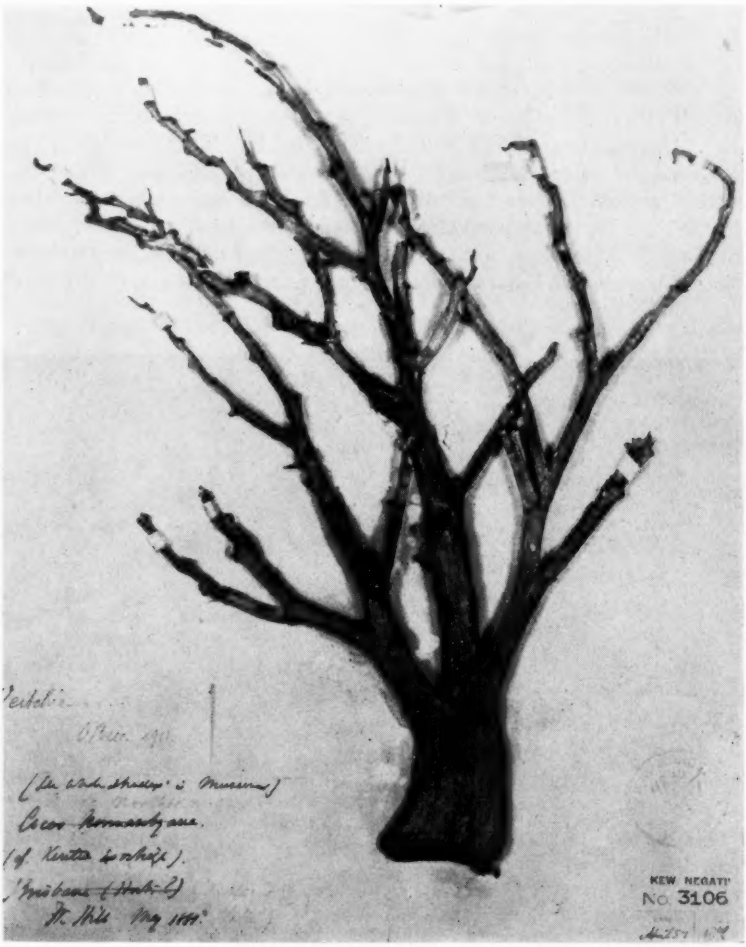
Locality uncertain, perhaps Cardwell, Australia, May 1881, *W. Hill s.n.* (K type).

Veitchia Hookeriana is a perplexing species. The type is fragmentary, consisting of a portion of a panicle, some loose staminate flowers, and three fruits in section sent from Australia by W. Hill. The original label is inscribed "Brisbane (Hort.?)" but this has been lined through in pencil and "Cardwell (Letter)" substituted. The letter indicated has not been located nor has a complete panicle noted on the label as in the museum at Kew. It is presumed, on the basis of the latter notation, that the portion of panicle is a basal branch (though conceivably it could be a small,

153. VEITCHIA HOOKERIANA. Fruit and seed from the type at Kew, reproduced with permission.

perhaps depauperate, entire panicle incomplete at the base). If it is a branch, then the panicle must be much more robust than that of any other known Veitchia and if the specimen is actually of Australian origin then it considerably extends the range of the genus.

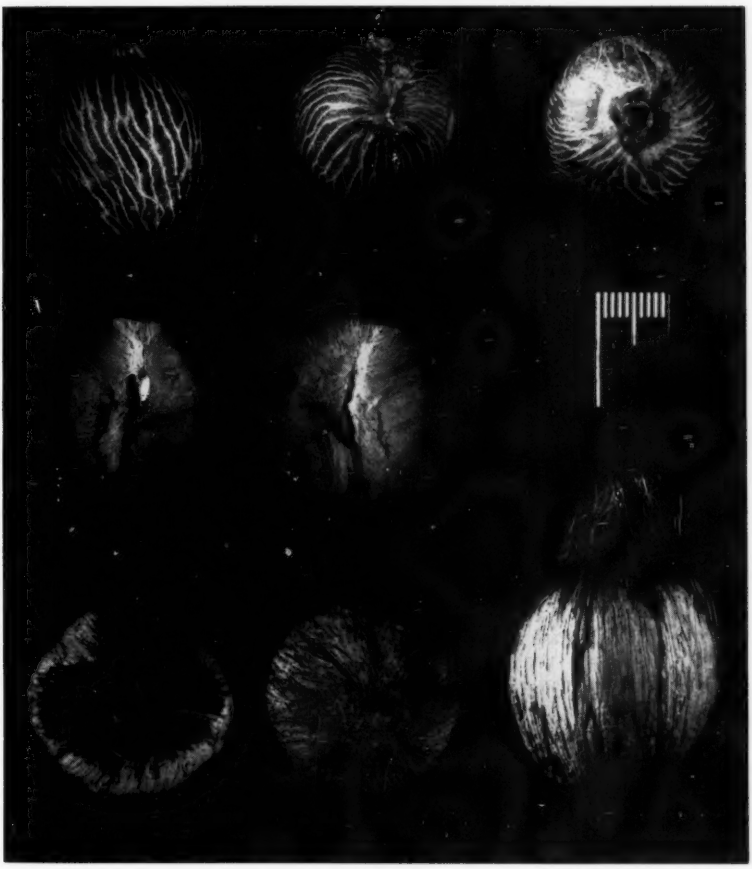
Until this species is rediscovered, its generic position must remain in question. The available material is quite conformable with Veitchia. If it



154. VEITCHIA HOOKERIANA. Portion of panicle from the type at Kew, reproduced with permission.

is actually Australian, however, it may, when foliage is examined, prove distinct as does Normanbya. It cannot now be associated with the latter because of the homogeneous endosperm.

The seed is notable in its apparent resemblance to that of *V. spiralis* so far as vascularization is concerned. Both have very fine vascular strands scarcely anastamosed (Figs. 153, 155) but they differ in size and shape. Pistillate flowers are restricted to the lowermost nodes of the rachillæ on the type, these rachillæ being stiffer and stouter than is usual in Veitchia



155. VEITCHIA SPIRALIS. Seed in three views (upper row) and split (center); fruit in three views (lower row), all from the type. Photographs courtesy of the British Museum (Natural History).

14. **Veitchia Metiti,** Becc. in Webbia, v, 77 (1921).

Fragment of panicle stout, flattened, 12 mm. wide, 6 mm. thick at base, the flattened and angular rachillæ to 10 cm. long, 4 mm. thick at the base, with triads borne at the lower nodes, the upper half strongly flexuous with staminate flowers only: fruit ellipsoid, 4.5 cm. long, 2 cm. in diameter, equally tapered to a slightly eccentric apical umbonate stylar cap 3 mm. long and to the base where closely subtended by a perianth one-third as high as the fruit, the petals 14-15 mm. high, 17 mm. across the mouth; seed rounded at base and apex, 2.3 cm. high, 1.6 cm. in diameter, the vascular branches descending and much anastamosed, endosperm homogeneous.

New Hebrides: Vanua Lava, 915 m. alt., *Harland s.n.* (FI type, photo BH neg. 3368).

The type consists only of a branch from a panicle and some loose fruit in the Beccari palm collection. These fruits were first ascribed to *Exorrhiza Wendlandiana* [*Clinostigma exorrhiza*] (Webbia, iii, 153 in obs., 1910), then described in their proper genus. Beccari wrote "Motiti" on the type specimen, both for the vernacular name and epithet but he consistently used Metiti as an epithet in his description and in the earlier reference. For a satisfactory comparison of the New Hebrides species, more adequate material is required. *Veitchia Winin* is readily distinguished by the small fruit, *V. Macdanielsii* and *V. Montgomeryana* by the longer straighter rachillæ on which pistillate flowers are borne nearly throughout.

15. **Veitchia spiralis,** Wendl. in Seem. Fl. Vitiensis, 270 in obs. (1868). Fig. 155.

? *Kajewskia aneityensis*, Guill. in Journ. Arnold Arb. xiii, 113 (1932).

Fruit broadly ovoid, 4 cm. long and not quite as many in diameter; seed subglobose, slightly protracted at the apex, 26 mm. long and nearly 26 mm. in diameter; vascular strands delicate, somewhat spiral, endosperm homogeneous.

New Hebrides: Aneityum, without definite locality, *M'Gillivray s.n.* (BM, holotype).

Only the fruit of this species is known. Thanks to the kindness of Mr. J. E. Dandy, Keeper of Botany at the British Museum (Natural History), photographs of a selection of the fruit and seed are reproduced here as Fig. 155.

According to M'Gillivray, the vernacular name for *Veitchia spiralis* is "Nakoi." New and more adequate collections are required before it can be fully understood. I have reduced the genus Kajewskia to Veitchia with little question as to its generic identity and suspect that *K. aneityensis* may eventually be referred definitely to *Veitchia spiralis* rather than to Carpoxylon as was done by Burret (Notizbl. Bot. Gart. Berlin, xi, 578, 1932 and Willdenowia, i, 349, 1956). The latter genus is also from Aneityum (or variously Aneitum, Aneytioum, Anatom) and known only from the fruit. As described and illustrated by Wendland and Drude (Linnaea, xxxix, 177, pl. 1, fig. 3, 1875), this differs from that of Veitchia in the decidedly eccentric stylar cap, in the short hilum, and in the thick woody endocarp.

For convenience of future comparison, a corrected description of *Kajewskia aneityensis* is incorporated below. No holotype was designated, hence I would select material at the Arnold Arboretum as lectotype. Guillaumin commented on the absence of staminodes in the pistillate flower and stated that the flowers were not regularly arranged in three's. Staminodes are present but are small, impressed against the ovary wall in flower, and readily overlooked. Flowers are definitely arranged in triads at the two to three lower nodes of the rachillæ but one or both of the staminate flowers have fallen leaving only scars. Nodes of the upper one-half to two-thirds of the rachillæ bear paired or solitary staminate flowers, the usual arrangement in Veitchia. Foliage and panicle are typical of that genus.

Stems to 18.25 m. high: leaves to 3.7 m. long, the rachis densely appressed-lepidote below, at length brown-punctate, the scales with persistent brown-membranous center and pale membranous margins splitting into a soft slender deciduous fringe, similarly but less densely vestite above but there with longer castaneous twisted basifixed scales at the base of the pinnæ; pinnæ from near center of the leaf ca. 66 cm. long, 7-8 cm. wide, narrowed to 2.5 cm. on the rachis where 3-3.4 cm. apart, obliquely truncate and toothed at the apex, glossy and glabrous above, dull, densely and minutely lepidote on all the nerves and the surface below, the scales with pale brown shining centers and pale membranous margins, the midrib and base below with numerous brown twisted basifixed scales to 10 mm. long and extending to 15 cm. from the base on the midrib: panicle 3-(?4)-times branched, the major axes compressed and angled, at anthesis rather densely lepidote with shining brown fimbriate soft scales, at length becoming glabrate, ultimate rachillæ 7.5-14 cm. long, stout, strongly flexuous, with 7-11 subdistichous flowering nodes, the lower 2-3 with pistillate and 2 staminate flowers, the remainder with paired or solitary staminate; staminate flowers 15 mm. long, the sepals 6 mm. high, 8 mm. wide, somewhat carinate basally, petals not lineolate when dry, 14 mm. long, 6-7.5 mm. wide, stamens 117-118, the filaments 4-4.5 mm. long, about as long as the basally sagittate, apically deeply bifid anthers; pistillate bud 9 mm. high, 10 mm. in diameter, the sepals

7 mm. high, 7 mm. wide, ciliate on the lower margins, the petals 8 mm. high, 6 mm. wide, shortly valvate at the apex, staminodes 6, deltoid: fruit not definitely known.

New Hebrides: Aneityum; Anelgauhat Bay, sea level, February 19, 1929, *Kajewski 784* (A, lectotype).

16. **Veitchia subglobosa,** Wendl. in Seem. Fl. Vitiensis, 272 (1868).
Kentia subglobosa, (Wendl.) F. Muell. Fragm. vii, 101 (1870).

Fruit oblong-ovoid; seed subglobose with narrow raphe, the vascular strands separated and anastamosed.

Fiji Islands: locality not specified, *J. Veitch* (type).

The type of *V. subglobosa* presumably was destroyed during the war. I have seen no additional authentic material in herbaria. Wendland's auxiliary remarks follow:

"Only a single fruit of this is known to me, which was collected by Mr. Veitch. It is about 4 cm. long, and not quite 3 cm. across, has a delicate and very fibrous mesocarp, and a very thin endocarp. The kernel is 23 mm. long, and not quite as many mm. across. This fruit having been put out to germinate, the outer part of the kernel and especially the raphe and its branches, had been somewhat injured, and I can only say with certainty that the raphe is narrow and does not penetrate into the albumen, and that its branches cross each other and are further apart than is the case in the other species of Veitchia."

Two collections in the Beccari palm herbarium at Firenze were identified as *Veitchia subglobosa* by Beccari. Both were collected under a completely erroneous name in the Sydney Botanic Gardens by J. L. Boorman, one in January, 1911 with staminate flowers, the other in February, 1912 with fruit (photo BH, negs. 3369-3371). I have not yet been able to obtain details on the history of the plants from which these specimens were obtained. The material is incomplete and unaccompanied by field notes. Median pinnæ are ca. 51 cm. long, 6.5 cm. wide, narrowed to a slender base where curved away from the rachis, tapered to an oblique sharply and finely toothed apex 3.5 cm. along the margin. Upper pinnæ are slightly shorter. All are clothed with rather long twisted dark scales at the base of the midrib below and the secondary nerves are prominently minutely dark-brown-lepidote on the lower surface. The panicle is twice- to probably thrice-branched, apparently glabrous though ravaged by fungus and insects (as are the fruits). Staminate flowers 12-13 mm. long, 6 mm. in diameter, have rather distinctly asymmetric petals and about 50 stamens equalled by a typical pistillode. Rachillæ are comparatively straight except for the apex, and have 12-15 flowering nodes most of which bear

scars of fruit or of pistillate flowers. Fruits measure 4-4.2 cm. long, 2.4-2.8 cm. in diameter with an apparently rather closely sheathing prominently crenulate perianth 1.4 cm. high. Seeds are 2 cm. long, 1.5-1.6 mm. in diameter, with homogeneous endosperm.

Beccari's conclusion as to the identity of these specimens seems reasonable. Certainly they appear to represent a distinct species notably in the small blunt-based fruit, and in the brown-punctate lower surface of the pinnæ. Unfortunately, my notes contain no description of the anthers. Certain other questions have not yet been resolved so that disposition of the species still remains problematical. *Veitchia simulans* from Taveuni is certainly closely related to the material discussed above.

† 17. **Veitchia filifera,** (Wendl.) trans. nov.

Ptychosperma filiferum, Wendl. in Bonplandia, x, 195 (1862) and in Seem. Fl. Vitiensis, 273 (1868).

Drymophlœus filiferus, (Wendl.) Scheff. in Ann. Jard. Bot. Buitenzorg, i, 158 (1876).

Vitiphœnix filifera, (Wendl.) Becc. in Ann. Jard. Bot. Buitenzorg, ii, 91, 126 (1885); Burret, in Fedde Repert. xxiv, 283 (1928).

Stems ca. 10 m. high, 13 cm. in diameter, smooth: leaf 3-4 m. long; pinnæ elongate-lanceolate, coriaceous, stiff, sharply acuminate at the apex where obliquely toothed with the upper side produced beyond the lower, sigmoid and narrowed at the base, slightly arched, glabrous, glossy and dark green above, somewhat gray pruinose and with lanceolate brown chaffy scales 10-15 mm. long on the midnerve at the base below, midnerve and marginal nerves thickened, the secondary nerves 5-7 on each side of the midnerve, the lowermost one or two pinnæ linear-lanceolate, 4-5 cm. long, 5-15 mm. wide, pendulous, often united at their tips and terminating in a lora to 2 m. long, 5 mm. wide, larger segments to 6 dm. long, 5-6 cm. wide, inserted 8 cm. apart.

Fiji Islands: Vanua Levu; near Bikana on the north side (Macuata [Mathuata] coast), *Seemann 661* (B, type (?) destroyed, BM, K isotypes).

The above description is taken from Wendland's original but is emended to delete description of fruit. Isotypes at the British Museum and Kew have only portions of the leaf which agrees with Wendland's account. Burret has discussed the Seemann collection formerly at Berlin which consisted of a leaf-section and fruit (Fedde Repert. xxiv, 283-284, 1928). According to him, fruits of two species were associated with the collection. Some, with the leaf, were those described by Wendland and appeared to be identical with fruit of *Seemann 662*, the type of *Veitchia vitiensis*. Others, collected by Seemann at Bikana without number were pyriform in shape

and measured 18 mm. in length, 8 mm. in diameter with a perianth 7 mm. high.

Until typotypic material can be obtained, the question of the identity of fruit and the exact circumscription and relationship of the species within the genus cannot be settled definitely. From conclusions stated in the discussion of *V. vitiensis* (page 515) it seems certain that the smaller fruits described by Wendland represented that species and that the larger fruits belonged with *V. filifera*. Seemann's notes provided in Flora Vitiensis, and the leaf-portion observed, make clear the relationship between *V. filifera* and the more recently described *V. pedionoma* and *V. sessilifolia*. It is unfortunate that the oldest species of this complex is incompletely known and that it cannot be contrasted reliably with the latter two.

† 18. **Veitchia Pickeringii,** (Wendl.) trans. nov. Fig. 150E.

Ptychosperma Pickeringii, Wendl. in Bonplandia, x, 194 (1862) [Pikeringii] and in Seem. Fl. Vitiensis, 273 (1868).

Vitiphœnix Pickeringii, (Wendl.) Burret, in Fedde Repert. xxiv, 284 (1928).

Trunk 5-10 m. high, 8-10 cm. in diameter: leaves 4-5 m. long, the sheath 50 cm. long, rather densely lepidote-floccose, the lepides with persistent brown center, subpersistent red-brown fimbriate margin and soft, pale, spreading or twisted deciduous hairs; petiole ca. 50 cm. long, densely appressed pale lepidote becoming brown-punctate above and below; pinnæ ca. 40 on each side of the rachis, this brown-punctate below, persistently and minutely red-brown fimbriate-lepidote above, the lower pinnæ inserted ca. 20 cm. apart, the median pinnæ inserted 3.5-4.5 cm. apart, 35-50 cm. long, 3.5-7 cm. wide, narrowed at the base, broadest at the middle, gradually narrowed to an oblique toothed apex ca. 2.5 cm. wide, 4.5 cm. along the margin, glabrous on both surfaces except for the brown-punctate marginal nerves, scattered minute red-brown fimbriate scales near the base and a line of elongate twisted brown basifixed scales on the midrib below, upper pinnæ 1.5-3.5 cm. apart, 17-35 cm. long, 1.5-3 cm. wide, subtruncate, the terminal united in a cuneate segment 22 cm. long, 4.7-5.7 cm. wide or cleft and the segments 9-10 cm. long, 10-15 mm. wide: panicle much-ramified, glabrous, at least the major axis compressed and angled, lower branches to 40 cm. long, twice-branched, the ultimate rachillæ 5-16 cm. long, with 9-18 flowering nodes in a loose spiral or subdistichous; staminate flowers greenish-white, 7-8 mm. long, the sepals 1.5 mm. high, spreading when dry, erect when moistened, petals 7-8 mm. long, 2 mm. wide, stamens 20-28, the white filaments 3-4 mm. long, as long as the basally sagittate apically acutely bifid yellow anthers; pistillate buds 4 mm. high, subtended by narrow inconspicuous bracteoles 0.5 mm. wide or less: fruit not known.

Fiji Islands: Ovalau; without definite locality *Pickering s.n.* (B, fide Burret, now destroyed, GH, lectotype); hills east of Lovoni Valley, 100-300 m. alt., May 8-11, 1953, *A. C. Smith 7276* (BH, US).

The above description is based principally on *Smith 7276* which differs from the fragmentary type only in the longer staminate flowers (8 mm. vs. 7 mm.) and in more numerous stamens (27-28 vs. 20-25). Unfortunately neither collection has fruit so that comparison with *V. vitiensis* is difficult. The species has narrow bracteoles subtending the pistillate flowers as in *V. vitiensis* and agrees essentially in the shape and indument of the pinnæ. The Smith collection, however, has a much longer petiole than any of the material assigned to *V. vitiensis*.

According to the collector, the vernacular name for this species is "Thangithake," a name presumably related to "Cagi Caki" cited by Seemann for *Veitchia filifera*. The specific epithet was incorrectly spelled in the original publication but was corrected in Flora Vitiensis. No holotype was designated for this species. Since the Pickering collection at the Gray Herbarium bears Wendland's annotation and agrees completely with the description, I would select it as lectotype.

Although both *Veitchia filifera* and *V. vitiensis* were reported from Ovalau by Seemann, I have seen no material definitely referable to them. Until complete series of specimens in flower and fruit can be obtained from Ovalau, the status of *V. Pickeringii* must remain in doubt.

EXCLUDED SPECIES

Veitchia Canterburyana, F. Muell. Fragm. vii, 101 (1870) in syn. = **Hedyscepe Canterburyana,** (Moore & F. Muell.) Wendl. & Drude.

Veitchia Storckii, Wendl. in Seem. Fl. Vitiensis, 270, pl. 81 (1868) = **Neoveitchia Storckii,** (Wendl.) Becc.

Vitiphœnix pauciflora, (Wendl.) Burret, in Fedde Repert. xxiv, 285 (1928) = † **Balaka pauciflora,** (Wendl.) trans. nov. [*Ptychosperma pauciflorum*, Wendl. in Bonplandia, x, 193 (1862)].

A Pickering specimen corresponding to Wendland's description of *Ptychosperma pauciflorum* in detail and annotated in his hand is present in collections of the Gray Herbarium. Although Burret indicated that he had seen authentic material, presumably at Berlin and destroyed, no specimen has heretofore been designated as the type. I would designate as lectotype *Pickering s.n.*, U.S. South Pacific Exploring Expedition 1838-1842 (GH). Wendland gave Ovalau as the locality from which Pickering collected the species. The lectotype, however, bears the name Upolu as does a second sheet consisting of a seedling plant though both have the printed locality Feejee Islands. Whether the specimen came from Ovalau or from Upolu, I have little doubt that it should be referred to the genus Balaka. The habit and leaf are correct for that genus. The

seed, although incompletely formed, has an acute base and apex and appears to be developing angularity.

Vitiphœnix samoensis, (Rech.) Burret, in Notizbl. Bot. Gart. Berlin, xii, 600 (1935) in obs., nomen alternativ. = **Drymophlœus samoensis,** (Rech.) Becc. ex Martelli.

Vitiphœnix Seemanni, (Wendl.) Becc. ex Martelli, in Nuov. Giorn. Bot. Ital. n.s. xlii, 87 (1935) in syn. = **Balaka Seemannii,** (Wendl.) Becc.

Vitiphœnix Withmiana, (Becc.) Burret [Whitmeeana], in Notizbl. Bot. Gart. Berlin, xii, 600 (1935) in obs., nomen alternativ. = **Drymophlœus Whitmeeanus,** Becc.

ARTICLE 22.

NEOVEITCHIA.

NEOVEITCHIA, Becc. in Webbia, v, 77 (1921) and xi, 108, fig. 31 (1955); Lemée, Dict. Descr. & Syn. Gen. iv, 712 (1932).

Solitary, moderately large, unarmed, monœcious palms with infrafoliar panicles and pinnate leaves: pinnæ numerous, reduplicate, linear, narrowed at the base, acuminate at the apex, with prominent elevated midnerve, thickened marginal nerves and numerous nerves of lesser orders, the midrib bearing occasional medifixed red-brown chaffy scales near the base or to the middle below: bracts subtending the panicle 2, caducous, the outer ?, the inner thin, rounded, rostrate, enclosing the panicle in bud and probably exserted from the outer, panicle short-pedunculate, 2-3 times branched into elongate angular rachillæ, these thick, becoming even stouter in fruit, flexuous, and bearing loosely spiralled somewhat sunken triads of a large pistillate flower below a pair of small staminate flowers at the lower 3-7 nodes, slender, nearly straight and bearing vertically paired staminate flowers in 7 prominent series of closely spiralled pits above, the staminate portion deciduous in fruit, primary axes and rachillæ subtended by acute narrow bractlets, the triads subtended by an acute produced portion of the rachillæ but margins of the staminate pits entire; staminate flowers somewhat asymmetric, small, subtended by a pair of overlapping curved bracteoles appressed against the bottom of the pit, that of the upper flower decurrent so that the upper appears to be ebracteolate, sepals imbricate, subacute to acute at the apex, petals about twice as long as the sepals when expanded, asymmetric and acute to nearly rounded at the apex, the lower half adnate to the stamens, the upper half valvate, spreading at anthesis, stamens 6, exserted at anthesis, the filaments subulate, inflexed at the apex in bud, connate and adnate to the petals and pistillode below, free above, the anthers dorsifixed, elliptic in outline, emarginate at base and apex, pistillode columnar, shorter than the stamens, about equalling the petals, trisulcate at the apex; pistillate flowers much larger than the staminate, subtended by a prominent cupule formed by 2 incompletely annular bracteoles, sepals broadly imbricate, petals slightly longer than the sepals, imbricate with shortly valvate apices, the entire perianth enlarged and cupular about the fruit, staminodes 3-6, dentiform, prominent at base of the fruit, pistil with short soft unilocular ovary containing a solitary laterally attached ovule, enlarged thickened style and 3 sessile obscure stigmas: fruit ellipsoid, tapered to the base and to a prominent conic apex tipped with persistent stylar remains, exocarp non-sclerosomatous, but drying minutely lineolate over a layer of numerous very slender elongate fibers, mesocarp stained with elongate red tannin cells and woody with elongate flat very stout fibers adherent to the thin osseous fragile endocarp; seed ovoid, attached laterally at the apex and about the embryo, flattened and slightly channelled but apparently free between base and apex, testa dark brown, vascular strands pale, descending and anastamosing from the apex, endosperm homogeneous, embryo basal.

One species, *Neoveitchia Storckii*, endemic to Viti Levu, Fiji Islands.

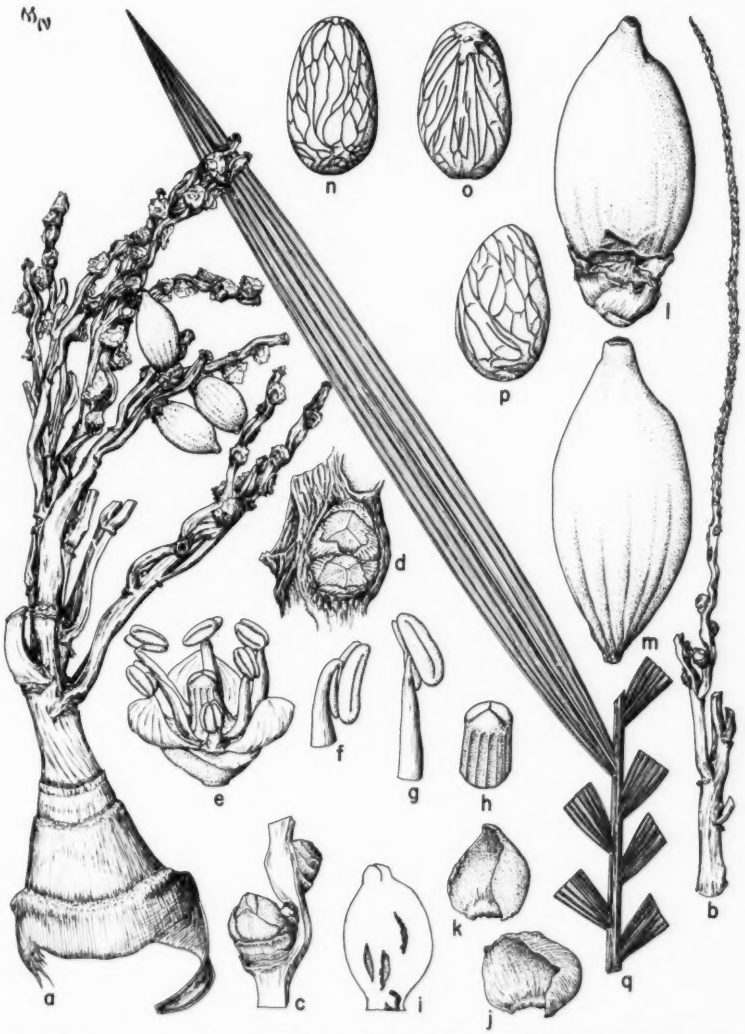
A discussion of the history of Neoveitchia has been included under Veitchia on page 483. Its relationship among the arecan palms is still not clear. There is a considerable resemblance to such genera as Actinorhytis, Ptychoraphis, Rhopaloblaste, and perhaps Hedyscepe, but the vertically paired staminate flowers of Neoveitchia set it apart from these. I have not seen material of Taveunia which may be related to Neoveitchia. Taveunia, however, lacks the prominent marginal nerves of Neoveitchia, the lower flowering nodes are said to have a pistillate and a staminate flower, the upper solitary staminate flowers only.

Neoveitchia Storckii, (Wendl.) Becc. in Webbia, v, 78 (1921); Burret, in Notizbl. Bot. Gart. Berlin, xv, 88 (1940). Fig. 156.

Veitchia Storckii, Wendl. in Seem. Fl. Vitiensis, 270, pl. 81 (1868).

Trunk smooth, dark brown at base, light brown towards the top (fide Storck) or light gray (fide Apenito et al.), straight, to 10 m. high: leaves 3.7-4.5 m. long; petiole short; rachis slightly convex, densely and minutely dark punctate below, angled and deciduous brown-lepidote-floccose becoming dark punctate above, pinnæ alternate or opposite at intervals of 2-4 cm., those from the middle of the leaf to 75 cm. long, 4.5-8 cm. wide, progressively smaller toward the tip, the apical 15-17.5 cm. long, 1-2.2 cm. wide, glabrous above, minutely brown-lepidote on the surface and secondary nerves and with dark chaffy medifixed scales on the midrib below, secondary nerves 7-9 on each side of the midnerve, 1 or 2 more prominent than the others: inner bract ca. 75 cm. long with rostrum 7 cm. long, densely and minutely brown-lepidote, peduncle 1-2 dm. long, brown-lepidote-floccose when young becoming brown-lepidote with appressed membranous scales, the scars of outer and inner bract respectively 5 and 8 cm. from the base and an incomplete annular bract borne below the first branches, the lower branches ca. 45 cm. long, again once or twice-branched into as many as 12 rachillæ, the lower pistillate portion of the ultimate rachillæ 3.5-7 cm. long, the slender staminate portion to 32 cm. long; staminate flowers 3 mm. broad in bud, at anthesis 4.5 mm. high, the sepals 2.5 mm. high, petals 4 mm. high, stamen-filaments 3 mm. long in their free portion, anthers 1 mm. long; pistillate flowers ca. 8 mm. high and broad in bud: fruit yellowish or reddish-yellow, 4.7-5 cm. long, 2.1-2.2 cm. in diameter, the seed 2.4-2.5 cm. long, 1.5 cm. wide, 1.4 cm. thick.

Fiji Islands, Viti Levu, type not designated, see discussion: Viti Levu; without specified locality, *Graeffe s.n.* (K, photo FI neg. 409 in Herb. Palm Becc., BH, neg. 4896); Naitasiri, Naduna near Waidradre Creek, May 15, 1956, *Apenito, J. Parham, & Koroiveibau 10133* (BH), Naduna Farm, October 9, 1956, *Koroiveibau, Nand, & Apenito 10590* (BH); Viria, July 1932, *Meebold 16780* (K, pro parte, M, pro parte).



156. NEOVEITCHIA STORCKII. a, panicle in fruit ×1/3; b, rachilla in flower with pistillate flowers below, staminate above ×1/3; c, portion of rachilla with pistillate flowers and staminate scar ×1; d, portion of rachilla with superposed staminate buds ×4; e, staminate flower expanded ×5; f, g, stamens in bud and at anthesis ×8; h, pistillode ×8; i, pistil in vertical section ×3; j, k, sepal and petal of pistillate flower ×2; l, m, fruit ×1; n-p, seed, n, antirapheal, o, rapheal, p, lateral views ×1; q, portion of leaf ×1/5. Flowers and foliage from *Apenito et al 10133*, fruit from *Koroveibau et al 10590*.

Thanks to the efforts of Mr. J. W. Parham and his associates, a splendid series of specimens collected in flower and in mature fruit has been available for study. The doubt expressed by Beccari and by Burret that the fruit illustrated in Flora Vitiensis belongs to *Neoveitchia Storckii* and not to a species of Veitchia has been removed. The material before me matches the illustration in detail.

Wendland cited three collections of this species, giving as locality the banks of the Rewa River on Viti Levu. Of the three, Storck, Pickering, Graeffe, I have seen only one, a Graeffe collection at Kew annotated by Beccari. This consists only of a flowering rachilla. Obviously other collections were more complete, for foliage and fruit were illustrated, but I do not know their whereabouts. Presumably the Storck collection should be designated as lectotype if it can be found. That failing, I would suggest the Graeffe specimen at Kew as lectotype, since it has also been studied by Beccari.

Burret has commented on the Berlin material of the Meebold collection cited, noting that parts of a fruiting panicle of *Rhopalostylis sapida* had been mixed with foliage of Neoveitchia. The same is true of the specimens at Kew and at München, although portions of panicle marked 1 and 2 and fruits in the carpological collection in the latter herbarium are true *Neoveitchia Storckii*.

The vernacular name "Vuleito" supplied Wendland by Storck is still current in Fiji. The fruit is eaten if obtainable before fully mature and the trunk is used for house posts. Unripe fruits were obtained in May, 1956, both flowers and essentially mature (though yet green) fruit in October, 1956.

ARTICLE 23.

REINHARDTIA.

The small genus Reinhardtia is singular among palms of the New World in a number of characters and has been variously treated by students of the family. Species are now in cultivation under the synonymous name Malortiea. Since I have been accumulating notes on Reinhardtia over a period of several years, it has seemed advisable to prepare a preliminary account which may serve to elucidate reasons for including Malortiea within the genus, to provide means of specific identification for botanist and horticulturist, and to point out the problems yet to be solved before our understanding of the genus can be considered satisfactory.

Reinhardtia belongs in the subfamily Arecoideæ as delimited by Beccari (Webbia, xi, 11, 1955). In some respects, it resembles genera of the tribe Linospadiceæ restricted to Australia, Lord Howe Island, New Guinea, and the Moluccas. In other respects it differs markedly, not only from this tribe but from the heterogeneous subtribe Moreninæ where Drude placed it (Nat. Pflanzenfam. II, iii, 64, 1889). Hooker's disposition of it (with Malortiea) in a taxon apart is more satisfactory although I would elevate his category of subtribe to the rank of tribe within the subfamily.* Further detailed consideration of its relationships and position in the complex of arecoid genera must be deferred.

Hooker and earlier students considered Reinhardtia and Malortiea distinct. Drude united them without explanation as did Baillon following him. Opinion has differed even in recent years. Burret discussed the two genera at length in 1932 and concluded that they were inseparable though both genera are keyed and listed more recently by Burret and Potztal in a manner that I fail to understand (Willdenowia, i, 353, 354, 373, 376, 381, 1956). Bailey maintained them apart but suggested that the matter needed more study. It may be well, therefore, to repeat briefly the history of the genera.

Reinhardtia was first used by Liebmann in 1845 as a name, the origin of which was not specified. A description was later published by Martius. According to Mölholm Hansen (private communication), the genus undoubtedly honored some member or members of the Reinhardt family. Johannes Christopher Hageman Reinhardt (1776-1845) was Liebmann's professor of zoology at the University of Copenhagen. His two children, Johannes Theodor (1816-1882), professor of zoology at Copenhagen and founder of the periodical Videnskabelige Meddelelser fra Naturhistorisk

* Tribe **Malortieæ,** (Hook f. in Benth. & Hook.) stat. nov.
Subtribe *Malortieæ*, Hook. f. in Benth. & Hook. f. Gen. Pl. iii, 876 (1883).

Forening, and Mathilde Wilhelmine (1820-1900), writer and author of Familie Erindringer, were Liebmann's contemporaries.

Liebmann's description as given by Martius stated that staminodes were lacking in the pistillate flower and that the ovary was unilocular. Hooker failed to note staminodes, perhaps because they are adnate to the petals and inconspicuous, but described the ovary as incompletely trilocular.* Burret notes that he had no pistils of *R. elegans* for study. Freehand sections of pistils from recent collections of *R. elegans* as well as of those from Liebmann reveal a completely trilocular but short and soft ovarial portion above which the septa disappear with a resultant 3-lobed to conic single cavity in the thickened stylar portion. The ovules are attached near the base of the placenta (Fig. 157Ah). Ovaries of species assigned to subgenus Malortiea are similar but are very short, soft, and with thin septa that rupture easily so that the ovary may appear unilocular and 3-lobed, the ovules attached very near the base of the axis and appearing basal.

Wendland distinguished Malortiea (named after Ernst von Malortie, Chief Marshall of the court of Hannover) from Reinhardtia on the basis of differences in rachillæ, arrangement of flowers, presence of staminodes, trilocular ovary, and broad several-nerved pinnæ. Burret has already noted that most of Wendland's distinctions fail but he did not note that in *R. elegans*, although the pinnæ are all one-nerved and very slender at the apex, the tips are bifid with a projecting midrib as in species with broader pinnæ (Fig. 159E). Hooker, too, failed to note this similarity for he used free acuminate pinnæ and numerous stamens to separate Reinhardtia from Malortiea, which he characterized as a genus with 6-12 stamens and confluent leaf-segments. I have not been able to verify the presence of 6 stamens. Wendland gave figures of 18-22 and later of 18-27 for Malortiea; the lowest number I have counted is 8.

The more numerous, but still inadequate, collections available today provide no characters for separation. Rather, they break down all distinctions, even that of ruminate versus homogeneous endosperm. *Reinhardtia latisecta* combines the fenestrate leaf of Malortiea with the robust habit, large panicle, large fruit, and deeply ruminate endosperm of *R. elegans*. At best, two subgenera can be recognized based on a combination of characters.

Species of Reinhardtia are inhabitants of the understory in rain-forest from southern Mexico to northern Colombia at low to moderate elevations. The largest, *R. elegans* and *R. latisecta*, are of moderate size, reaching a height of 6-8 meters. Other species are half as high or less. Most

* Hooker numbered the species as three but examination of the collections seen by him at Kew does not bear this out. Two collections of Liebmann (one bearing another manuscript name) and one of Jurgensen are all referable to *R. elegans*.

are cespitose. Their slender clumped stems, low stature, unusual foliage, orange-red panicles or spikes with contrasting black fruit at maturity make them attractive subjects for the grower. One of the varieties of *Reinhardtia gracilis* and *R. simplex* were cultivated in Europe during the last century. The same species were cultivated in Los Angeles early in this century. Within recent years, new introductions have brought *R. simplex*, *R. gracilis* var. *rostrata*, and either var. *gracilior* or var. *tenuissima* into the United States again.

In the present account, five species are recognized. Four of these, *R. elegans*, *R. Koschnyana*, *R. latisecta*, and *R. simplex* are discrete taxa readily distinguished. As it is defined here, the fifth species, *R. gracilis*, is a variable taxon composed of four subordinate taxa discussed in greater detail on page 555.

Reinhardtia is of interest because reduction in size, foliage, inflorescence, flowers, and fruit closely approaches a linear series. *Reinhardtia elegans* seems to be the most primitive species—single-trunked, with numerous one-nerved pinnæ, a large panicle, large flowers, the staminate with numerous stamens, the pistillate with trilocular ovary and large fruit, the seed with deeply ruminate endosperm below numerous vascular strands in the testa. *R. latisecta* is similar, with cespitose habit, multinerved pinnæ fenestrate basally, and fewer stamens. The *R. gracilis* complex shows further reduction in foliage, panicle, stamens, ovary, vascularization of the testa, and nearly completely homogeneous endosperm. *R. simplex* and *R. Koschnyana* have non-fenestrate leaves and *R. Koschnyana* has reduced stamens, spicate inflorescence, and dwarf stature.

REINHARDTIA, Liebm. in Overs. Kgl. Dansk Vidensk. Selsk. Forh. Kjöb. 1845, 9 (1846), nomen, and in Mart. Hist. Nat. Palm, iii, 311 (1849); Walp. Ann. Bot. Syst. iii, 459 (1852); Hook. f. in Benth. & Hook. f. Gen. Pl. iii, 906 (1883); Hemsl. in Godman & Salvin, Biol. Cent. Amer. Bot. iii, 402 (1885); Drude, in Engler & Prantl, Nat. Pflanzenfam. II, iii, 64 (1889); Baill. Hist. Pl. xiii, 382 (1895); Standl. in Contr. U. S. Nat. Herb. xxiii, 77 (1920); Burret, in Notizbl. Bot. Gart. Berlin, xi, 551 (1932); Lemée, Dict. Descr. & Syn. Gen. v, 758 (1934); Standl. & Record, in Field Mus. Nat. Hist. Bot. Ser. xii, 85 (1936); Standl. in Field Mus. Nat. Hist. Bot. Ser. xviii, 124 (1937); Bailey, in Gent. Herb. vi, 258 (1943); Conzatti, Fl. Taxonomica Mex. ii, 12 (1947); Bailey, in Gent. Herb. viii, 189 (1949); Moore, in Principes, i, 128 (1957).

Moderate to very small, solitary or cespitose, unarmed, monœcious palms with interfoliar inflorescences and pinnate or undivided and pinnately nerved leaves having tubular sheaths but not forming a crownshaft, the blades before expansion margined with slender continuous fragile

loræ (at least in subgenus Malortiea), these with a short thickened hamus on one side at the apex and attached to the mucronate continuation of the midrib of each segment, fragmenting and deciduous as the blade unfolds; plants, when young, vestite in all parts except the flowers with shining, red-brown, fringed, appressed, deciduous, subpersistent or persistent lepides attached at the middle by minute persistent bases, in age becoming conspicuously or inconspicuously brown-dotted especially on the leaves and panicle in subgenus Malortiea, scales persistent on leaf-petiole and rachis of subgenus Reinhardtia: leaf-sheaths tubular at first with a ligule of closely interwoven fibers produced 1-several cm. above and opposite the petiole, the fibers at length fraying and disappearing, the sheath then tubular for only a few cm. above the node and angled to the petiole; petiole concave to nearly plane above, rounded below and in subgenus Malortiea narrowed and wing-like at the margin; rachis rounded below, angled or flexuous above; pinnæ reduplicate, 1-several-nerved, the margins not thickened, the midrib produced in a short mucro, the apices bidentate or, when united, obliquely and sharply toothed: inflorescences solitary at the nodes, spicate or paniculate, sometimes subdigitately so, with all the rachillæ unbranched or with the lower axes once-branched and each axis subtended by an acute striate bractlet, the fertile portion becoming orange-red at maturity, the entire inflorescence at first enclosed by 2 persistent tubular papery bracts inserted close together at the base of the elongate peduncle, the outer bract usually included within the sheath (except *R. elegans*?), ancipitous, acute, rupturing along the abaxial side, more or less concave on the adaxial side, the inner bract included or exserted, at length much exceeded by the peduncle and marcescent; flowers white or creamy-white, arranged in triads of ♂ ♀ ♂ throughout most of the inflorescence but often paired or solitary ♂ near the tip of spike or rachillæ, borne in shallow depressions each of which is subtended by an acute striate prominent semi-operculate (in bud) bractlet in loose spirals or more rarely subdistichous to distichous along the axis, the staminate flowers slightly asymmetric, subtended by an external lateral striate generally deciduous bracteole, the sepals strongly imbricate, obtuse, striate when dry, concave and at least the outer more or less strongly keeled, petals acute, valvate, ovate-elliptic, two to three times as long as the sepals, striate when dry, stamens 8-40, the short filaments briefly united in an angled column and adnate to the petals at the base, distinct above and not inflexed at the tip, the anthers basifixed or medifixed with bifid to sagittate bases and bifid to acute apices, dehiscing by vertical slits, pistillode lacking; pistillate flowers symmetric or nearly so, subtended by a pair of persistent markedly striate (when dry) sepal-like bracteoles with a concave depression on the back, perianth enlarged and persistent on the fruit when dry, the subglobose sepals strongly imbricate, rather strongly striate along the margins when dry, the corolla conic in bud, the petals about one and a half times as long as the sepals, slightly imbricate and often partially connate at the base, valvate above or nearly completely valvate in smaller species, the apices 2-grooved inside and spreading at anthesis, staminodes connate basally and adnate very shortly or to about half the length of the petals, then distinct and divided into 2-5 slender teeth, these usually erect, projecting, and conspicuous at anthesis; pistil ovoid or ellipsoid with very short soft ovary, enlarged

thickened style and stigmas recurved at anthesis, ovary trilocular, at least basally, with usually 3 ovules attached slightly above the base on the very short to well-developed central axis but often appearing basal, only one maturing: fruit blackish when mature, 1-seeded, ellipsoid, ovoid, or obovoid with apiculate to conic apical or slightly eccentric stylar cap, the exocarp smooth, thin, striate when dry, the mesocarp of 1-2 layers of elongate flattish fibers of several widths in a very thin pulp, endocarp very thin, fragile, shining, not adherent to the seed; seed oblong-ellipsoid to ovoid, attached laterally in subgenus Reinhardtia, basally in subgenus Malortiea, more or less sculptured by the simple, furcate or very loosely branched, impressed vascular strands emanating from the sides or apex of a superficial or impressed raphe; endosperm homogeneous or ruminate; embryo basal.

Five species of dwarf to moderate understory palms in rain-forests, usually at low altitudes, from southern Mexico to northern Colombia are placed in two subgenera:

Subgenus **Reinhardtia**

Subgenus *Eureinhardtia*, Drude, in Engler & Prantl, Nat. Pflanzenfam. II, iii, 64 (1889).

Seed attached laterally along an impressed raphe, the endosperm strongly and deeply ruminate: stamens 27-40: petiole neither pale nor winged along the margin below, densely and persistently appressed brown-lepidote: solitary or cespitose species of moderate size.

Type species: *R. elegans.*

Included species: *R. elegans, R. latisecta.*

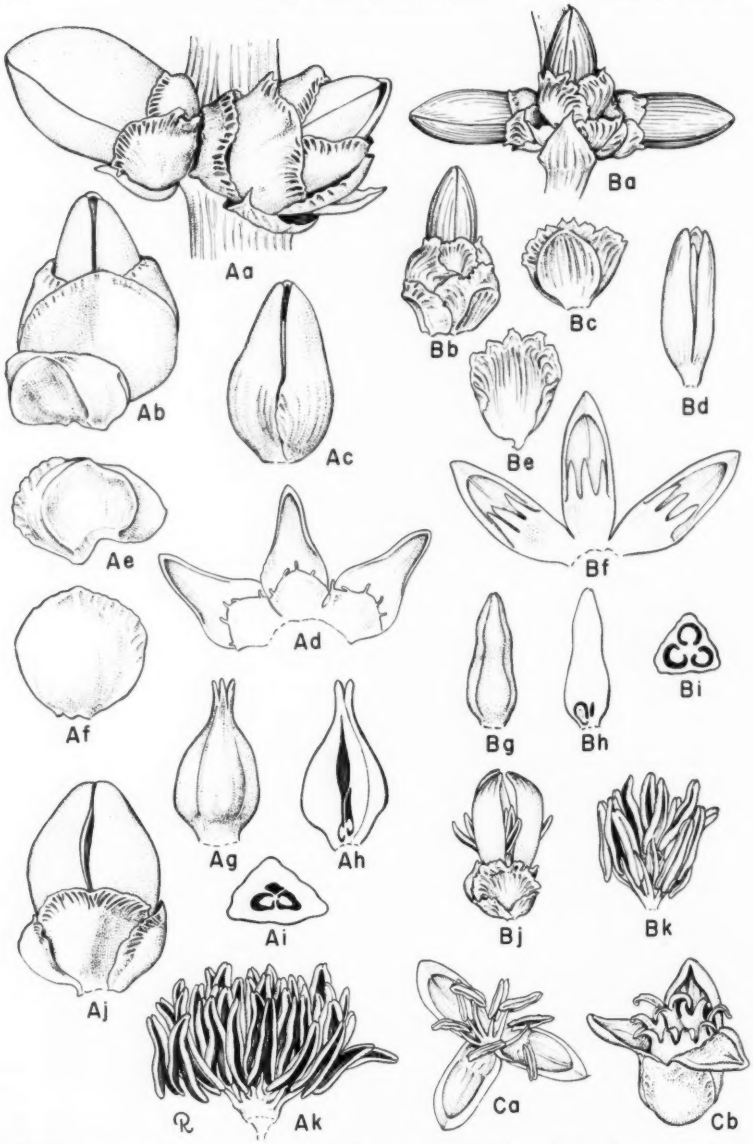
Subgenus **Malortiea,** (Wendl.) Drude, in Engler & Prantl, Nat. Pflanzenfam. II, iii, 64 (1889).

Malortiea, Wendl. in Allgemeine Gartenzeit. xxi, 25, 145 (1853); Hook. f. in Benth. & Hook. f. Gen. Pl. iii, 906 (1883); Hemsl. in Godman & Salvin, Biol. Cent. Amer. Bot. iii, 402 (1885); Standl. in Field Mus. Nat. Hist. Bot. Ser. x, 116 (1931); Bailey, in Gent. Herb. vi, 258 (1943); Bailey, in Ann. Missouri Bot. Gard. xxx, 389 (1943); Bailey, in Gent. Herb. viii, 189 (1949).

Seed attached basally, the raphe little or not impressed, the endosperm homogeneous but in *R. gracilis* sometimes with shallow intrusions below the vascular strands: stamens 8-22: petiole pale below where rounded in the center and narrowed to wing-like margins, deciduously brown-lepidote becoming brown-punctate in age: single-stemmed or generally cespitose species of small or very small size.

Type species: *R. gracilis.*

Included species: *R. gracilis, R. Koschnyana, R. simplex.*



157. FLOWERS OF REINHARDTIA ×5. A, R. ELEGANS; Aa, flowering node; Ab, pistillate flower and bracteole; Ac, pistillate corolla; Ad, pistillate corolla expanded to show staminodes; Ae, bracteole; Af, pistillate sepal; Ag, pistil; Ah, pistil in vertical section; Ai, ovary in cross-section ×10; Aj, staminate flower; Ak, androecium; all from *Hernandez and Sharp X-1245*. B, R. GRACILIS var. GRACILIS; Ba, flowering node; Bb, pistillate flower and bracteoles; Bc, bracteole; Bd, pistillate corolla; Be, pistillate sepal; Bf, pistillate corolla expanded to show staminodes; Bg, pistil; Bh, pistil in vertical section; Bi, ovary in cross-section ×10; Bj, staminate flower; Bk, androecium; all from *Yuncker 4617*. C, R. GRACILIS var. ROSTRATA; Ca, staminate flower; Cb, pistillate flower at anthesis; from *Boynton 3B*.

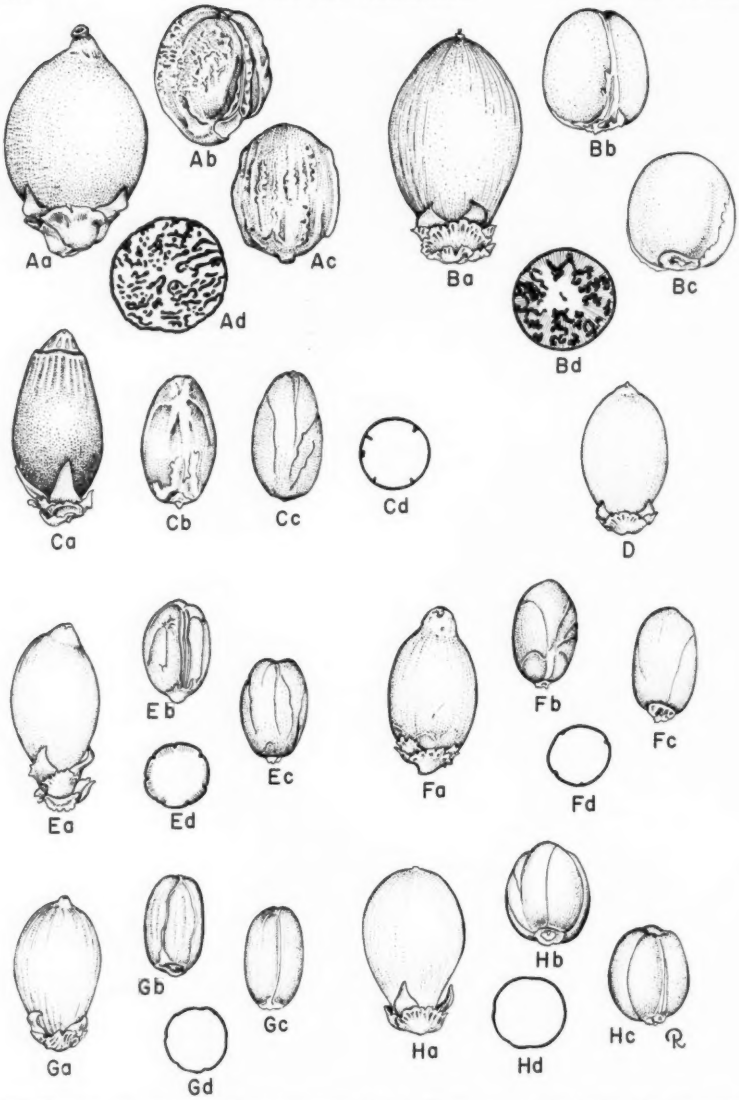
Key to species of Reinhardtia

1. Petiole not pale nor wing-margined below, densely and persistently appressed brown-lepidote; stamens 27-40: seed attached laterally along an impressed raphe, the endosperm strongly and deeply ruminate.....Subgen. REINHARDTIA
   2. Pinnæ 38-40 on each side of the rachis, all 1-nerved, bifid-attenuate at the apex: stamens (28-) 35-40. Mexico.....1. *R. elegans*
   2. Pinnæ 2-3 on each side of the rachis, the lower and upper several-nerved and fenestrate between most of the nerves along the rachis, the intermediate when present usually 1-nerved, apices sharply and obliquely toothed, not attenuate: stamens ca. 27. British Honduras, Guatemala.....2. *R. latisecta*
1. Petiole pale and narrowly winged along the margin below, deciduously brown-lepidote becoming merely brown-punctate in age: stamens 8-22: seed attached basally, the raphe little or not at all impressed, the endosperm essentially homogeneous (but in *R. gracilis* sometimes with shallow intrusions below the vascular strands).....Subgen. MALORTIEA
   3. Leaves fenestrate between most of the nerves along the rachis, deeply bifid at the apex, upper margins of pinnæ 8.5-20 cm. long or more. Southern Mexico to eastern Costa Rica.....3. *R. gracilis*
   3. Leaves not fenestrate between the nerves, bifid at the apex for 1-6 cm.
      4. Inflorescence a panicle of 3-7 simple or rarely furcate rachillæ: leaves bifid for 1-2.5 or very rarely to 4 cm. at the apex, simple or usually with a pair of separate pinnæ below the nearly entire apical segment, the nerves 10-12 on each side of the rachis: stamens (12-)14-17(-22). Honduras to Panama.....4. *R. simplex*
      4. Inflorescence a spike: leaves always simple, bifid for (3.5-)4.5-6 cm. at the apex, nerves 8-9 on each side of the rachis: stamens 8-10. Costa Rica to Colombia.....5. *R. Koschnyana*

1. **Reinhardtia elegans,** Liebm. in Overs. Kgl. Dansk. Vidensk. Selsk. Forh. Kjöb. 1845, 9 (1846), nomen, and in Mart. Hist. Nat. Palm. iii, 311 (1849); Walp. Ann. Bot. Syst. iii, 459 (1852); Hemsl. in Godman & Salvin, Biol. Cent. Amer. Bot. iii, 462 (1885); Standl. in Contr. U. S. Nat. Herb. xxiii, 77 (1920); Burret, in Notizbl. Bot. Gart. Berlin, xi, 553 (1932); Bailey, in Gent. Herb. vi, 258, fig. 137 (1943); Conzatti, Fl. Taxonomica Mex. ii, 12 (1947); Bailey, in Gent. Herb. viii, 189, fig. 80 (1949); Moore, in Principes, i, 134 (1957). Figs. 157A, 158A, 159E, 160, 161.

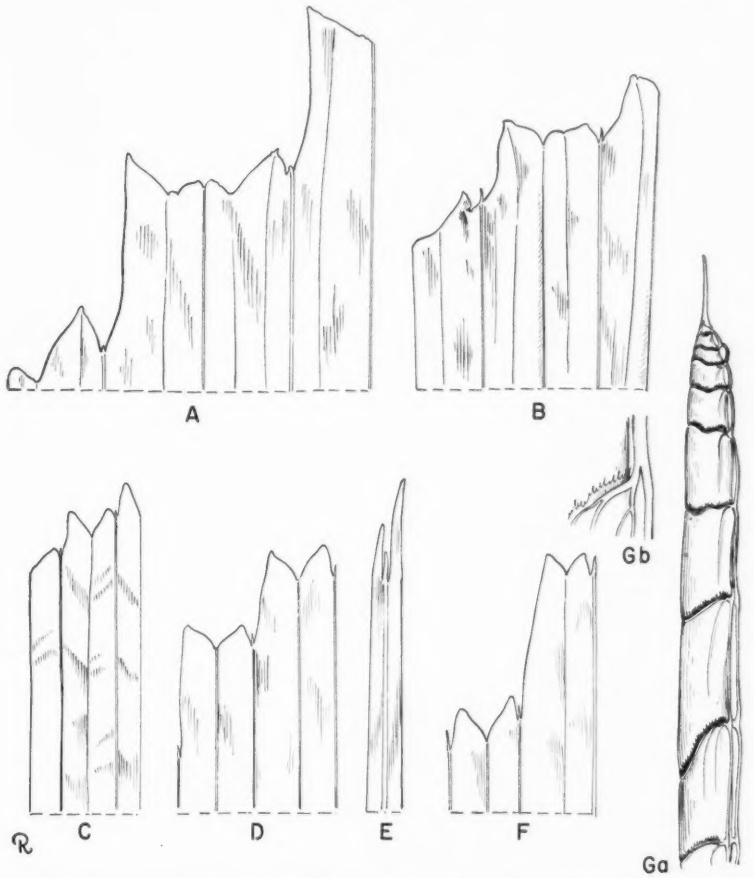
   Reinhardtia spinigera, Bailey, in Gent. Herb. viii, 191, fig. 81 (1949) quoad paniculam.

Stems solitary, erect, 2.5-6 m. high, bearing a crown of 10-12 spreading regularly pinnate leaves, the sheaths ca. 2.5 dm. long, in age stout, open, margined with slender fibers; petiole ca. 32 cm. long, rounded, densely and more or less persistently brown-lepidote below, concave and inconspicuously brown-dotted above, not wing-margined, the rachis ca. 11 dm. long, rounded and at length densely brown-dotted below, becoming angled above, pinnæ ca. 38-40 on each side of the rachis at intervals of (0.3-0.4-) 1.5-2.5 cm., linear-elliptic, tapering to a narrow base and attenuate to a deeply bifid apex so slender as to appear acute, this usually frayed, the prominent midrib keeled above, lepidote at least basally below, projected in a minute point, slender secondary nerves 3-4 on each side interspersed with very fine tertiary nerves, basal pinnæ to 36 cm. long, 8 mm. wide,

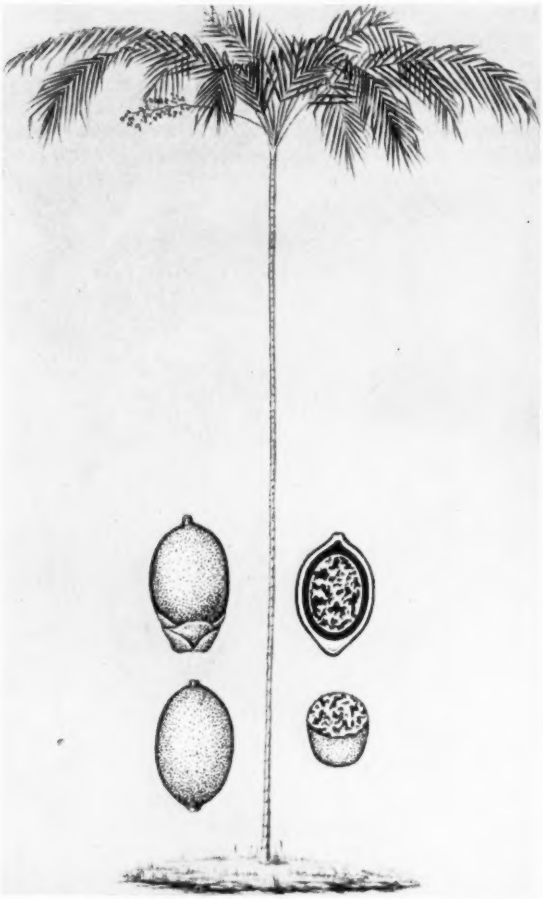


158. Fruits and seeds of Reinhardtia ×2. A, R. elegans; Aa, fruit; Ab, Ac, seed; Ad, seed in cross-section; from *Hernandez and Sharp X-1245*. B, R. latisecta; Ba, fruit; Bb, Bc, seed; Bd, seed in cross-section; from *Schipp 1149*. C, R. gracilis var. gracilis; Ca, fruit (immature); Cb, Cc, seed; Cd, seed in cross-section; from *Steyermark 39908*. D, R. gracilis var. tenuissima, fruit from *Galeotti 4983*. E, R. gracilis var. gracilior; Ea, fruit; Eb, Ec, seed; Ed, seed in cross-section; from *Moore and Cetto 6265*. F, R. gracilis var. rostrata; Fa, fruit; Fb, Fc, seed; Fd, seed in cross-section; from *Maxon 176*. G, R. simplex; Ga, fruit from *Pittier and Durand 8625*; Gb, Gc, seed; Gd, seed in cross-section from *von Wedel 611*. H, R. Koschnyana; Ha, fruit from *Holm and Iltis 113*; Hb, Hc, seed; Hd, seed in cross-section from *Cook and Doyle 52*.

median pinnæ to 42 cm. long, 15 mm. wide, subapical pinnæ to 24 cm. long, 10 mm. wide, apical pinnæ to 12 cm. long, 4 mm. wide, drying dark brownish-green above, paler below where brown-dotted: inflorescence a panicle of 5-9 rachillæ 12-36 cm. long bearing 14-33 flowering nodes in spirals from a rachis 6-15 cm. long, the lower rachillæ often furcate, the persistently red-brown-lepidote peduncle 8.5-9.4 dm. long, outer bract ca. 4 dm. long, inner to ca. 8 dm. long; staminate flowers 7-8 mm. long,



159. Leaf-margins and loræ of Reinhardtia ×2. A, R. gracilis var. gracilis, leaf-margin from *Watson 499*. B, R. gracilis var. tenuissima, leaf-margin from *Galeotti 4983*. C, R. simplex, leaf-margin from *von Wedel 1006*. D, R. Koschnyana, leaf-margin from *Haught 5535*. E, R. elegans, apex of pinna from *Hernandez and Sharp X-1245*. F, R. latisecta, leaf-margin from *Schipp 1149*. G, R. gracilis var. rostrata; Ga, portion of unexpanded leaf to show loræ; Gb, attachment of individual segment to lora greatly enlarged; from *Boynton 3B*.



160. REINHARDTIA ELEGANS. Habit of plant as drawn for Liebmann's Icones Palmarum at Copenhagen with insert fruits added. Reprinted from Gentes Herbarum, vi, 259, fig. 137 (1943).

sepals 2.5-3 mm. long, striate below the thin membranous entire margins, petals 6-7 mm. long, acute, stamens (28-)35-38(-40), the filaments 2 mm. long, the anthers 3 mm. long, deeply sagittate at the base, bifid at the apex; pistillate flowers 6-7 mm. high, the entire sepals 4 mm. high, staminodes adnate to the petals for 2 mm., the distinct free teeth short and slender, pistil ovoid, the style more or less 3-angled and -grooved: fruit very dark purple at maturity, 16-18 mm. long, 9-12 mm. in diameter, broadly ellipsoid or obovoid, rather abruptly narrowed to a slender apical or slightly eccentric stylar cap 1.5 mm. high, the endocarp shining brown; seed irregular, oblong-ellipsoid and somewhat compressed laterally, 10 mm. long, 10 mm. wide, 8 mm. thick, attached laterally along an impressed raphe extending nearly the length of the seed from an irregularly impressed oblique base, the dark red-brown testa rugulose between elongate lengthwise impressions when dry; endosperm strongly ruminate.

Southern Mexico at altitudes of 1000 m. or more, lectotype *Liebmann 10805* (C): Oaxaca; without definite locality, 1844, *Galeotti 4977*

161. REINHARDTIA ELEGANS. Parts of a leaf and inflorescence in fruit somewhat less than one-half natural size. Reprinted from Gentes Herbarum, viii, 190, fig. 80 (1949).

(BR, F, L); from Río Grande (north of Niltepec) to Finca "La Gloria", alt. 1250 m., March 4, 1946, *E. Hernandez X. & A. J. Sharp X-1245* (BH); Sierra San Pedro Nolasco, Talea, etc., 1843-44, *Jurgensen 760* (BM, K); Teotalcingo & Cumbre de Teotalcingo, *Liebmann s.n.* (BR, GH, K); Cuesta de Teotalcingo, June 1842, *Liebmann 10805* (C, lectotype, photo BH, F neg. 21067; GH, A, MO, US, isolectotypes); without definite locality, *Liebmann 6572* (C, photo BH, F neg. 21068, GH): Cerro Caracol, near Latani, Distr. Choapam, 17°24′ lat., 95°48′ long., alt. 1600 m., May 11, 1939, *R. E. Schultes 886* pro parte (BH): Chiapas: mountains near Fenix, April-May, 1925, *Purpus 240* (US), June, 1925, *Purpus 10240* (GH), May-June, 1925, *Purpus 10550* pro parte (NY).

This species was first recorded by Liebmann as a name only. A description supplied by him was published by Martius in 1849. No definite type was cited though the place of collection appeared as "Mexico tractus montium inter Chuapan [Choapam] et Tiutalcingo [Teotalcingo], alt. 3500′." Liebmann's specimens were distributed to leading herbaria from Copenhagen, some with, some without a collection number. A specimen in Martius' personal herbarium, now incorporated in the general herbarium at Bruxelles and cited above, consists only of three detached panicles in flower or from which fruit has fallen. There is no indication that this was sent by Liebmann himself. More complete material in the herbarium at Copenhagen must, therefore, be considered in selecting a type. I would designate as lectotype the oversize specimen bearing the number *10805*, duplicates of which exist in other herbaria.

Reinhardtia elegans is the only species in the genus in which the pinnæ are all one-nerved. The numerous slender-tipped pinnæ originally described as linear-lanceolate and acuminate appear at first glance quite different from those of other species in the genus. Examination of carefully prepared material, however, shows that the difference is only one of degree. The apex of individual segments is bifid-acuminate rather than truncate but is obliquely so with the characteristic projection of the midnerve, elongate upper and shorter lower side characteristic of other species (Fig. 159E).

2. **Reinhardtia latisecta,** (Wendl.) Burret, in Notizbl. Bot. Gart. Berlin, xi, 554 (1932); Standl. & Record, in Field Mus. Nat. Hist. Bot. Ser. xii, 86 (1936); Langlois, in Principes, i, 48, 50, photographs (1957); Moore, in Principes, i, 134 (1957). Figs. 158B, 159F, 162.

Malortiea latisecta, Wendl. in Allgemeine Gartenzeit. xxi, 146

162. REINHARDTIA LATISECTA from the wild at Stann Creek Valley, British Honduras. Photograph by A. C. Langlois, reprinted from Principes, i, 48 (1957).

(1853); Hemsl. in Godman & Salvin, Biol. Cent. Amer. Bot. iii, 402 (1885) as to reference but not as to specimen cited.

Stems erect, cespitose in clumps of 8-9, to 8 m. high, 6.5 cm. in diameter, naked below, sheathed in upper part with about 10 leaves in a spreading crown, the sheaths ca. 2.5 dm. long, ligule 8 cm. long or more; petiole 35-45 cm. long, rounded below where densely vestite with appressed dark red-brown subpersistent scales, green and channelled above, the rachis 45-80 cm. long or more, densely vestite with subpersistent brown scales, becoming angled toward the tip, blades obovate in general outline from a cuneate base, the 2-3 broad 1-several-nerved pinnæ inserted 4-10 cm. apart on each side of the rachis and fenestrate between most of the 21-24 pairs of nerves at the rachis, the nerves keeled above, clothed with brown scales below, the basal pinnæ to 62.5 cm. long, 11.5 cm. wide, falcately curved on the lower margin, 7-9-nerved, the intermediate pinnæ, when present, solitary or paired and 1-nerved, the apical pinnæ divergent at a very acute angle, cuneate-flabellate in outline, to 60 cm. long, 15 cm. or more wide, 14-15-nerved, the lower margin longer than the upper, the apices of all pinnæ obliquely and sharply toothed: inflorescence an erect or arching panicle exceeding the leaves, with 15-19 branches to 20 cm. long or more, the lower usually once-branched, the median and upper rachillæ undivided, all densely brown-lepidote, white in flower, becoming bright red in fruit, the bracts firm, short, scarcely exceeding the sheath, peduncle 1 m. long or more, 1.5 cm. wide, more or less flattened and densely brown-lepidote; staminate flowers ?, the stamens 22 (fide Burret) -27 (fide Wendland); pistillate flowers not described: fruit black at maturity, ellipsoid or obovoid, 17 mm. long, 11 mm. in diameter; seed ellipsoid, 11 mm. long, 9 mm. in diameter, attached laterally along the impressed raphe, vascular branches descending from the apex; endosperm deeply ruminate.

British Honduras, Guatemala, type *Kegel s.n.* (HAN, destroyed). Guatemala: without definite locality, *Kegel s.n.* (HAN, type, destroyed). British Honduras: Mile 19, Stann Creek Railroad, March, 1941, *A. C. & M. Langlois s.n.* (BH, photographs only); Middlesex, alt. ca. 60 m., September 29, 1929, *W. A. Schipp S-56* (F, photo BH); Río Grande, alt. ca. 76 m., February 18, 1933, *Schipp 1149* [S-370] (A, BM, GH, K, MO, NY, UC); Stann Creek Valley, January 8, 1932, *Schipp 8370* (fide Burret, not seen and presumably destroyed at Berlin).

The type of this species, communicated to Wendland by Kegel from Halle, has been destroyed. It consisted of a leaf and flowering panicle. To fix further interpretation I would designate *Schipp 1149* [S-370] at the Gray Herbarium as neotype despite the fact that the specimen is in fruit. I have seen no specimens in flower. Kegel's material was reportedly from Guatemala but more likely from what is today considered British Honduras. I have seen no authentic specimens from Guatemala as that country is presently constituted.

Reinhardtia latisecta is of interest because the foliage, except the persistently lepidote petiole, resembles that of subgenus Malortiea more than that of *R. elegans* to which it is obviously allied in other respects. M. A. Langlois has described and illustrated the species as it occurs in the Stann Creek Valley in Principes, i, 48-53 (1957).

3. **Reinhardtia gracilis,** (Wendl.) Burret, in Notizbl. Bot. Gart. Berlin, xi, 554 (1932); Moore, in Principes, i, 135 (1957).

Malortiea gracilis, Wendl. in Allgemeine Gartenzeit. xxi, 26, 146 (1853); Hemsl. in Godman & Salvin, Biol. Cent. Amer. Bot. iii, 402 (1885); Standl. in Field Mus. Nat. Hist. Bot. Ser. x, 116 (1931).*

Stems solitary or cespitose in dense to loose clumps, or more or less colonial with stems 2.5-4.5 dm. apart, to 2.45 m. high, to 1.4 cm. in diameter, brown and naked below, sheathed in upper portion with 6-20 or more spreading leaves, the sheaths 6-15 cm. long, ligule 1-4 cm. long; petiole 7-60 cm. long, rounded and narrowly wing-margined below where pale and brown-lepidote or brown-dotted, pale, flat and glabrous above, the rachis 3.5-23 cm. long, terminating in a slender deciduous or subpersistent filament, pale, rounded and brown-dotted below, angled and glabrous above, the pinnæ 2 or rarely 3-4 on each side of the rachis, fenestrate between most of the 8-22 nerves on each side of the rachis, the lower (and intermediate when present) narrowly cuneate with very sharply toothed oblique apex, 3-7-nerved, 8.5-25 cm. long, 1.3-6.5 cm. wide, the upper pinnæ similar but broader, 5-16-nerved, the upper margin 7.5-23 cm. long, the lower margin 9.5-22 cm. long, 2.8-15 cm. wide, minutely and rather densely brown-dotted below, glabrous above: inflorescence a panicle of 2-11 or more rachillæ, these undivided or the lower ones furcate or branched, the ultimate divisions 2.5-29 cm. long, at first lepidote, then subglabrous; outer bract included in the sheath, the inner bract to 35 cm. long, exserted but soon marcescent, peduncle to ca. 50 cm. long, brown-dotted, the rachis 1-11 cm. long, at length subglabrous as are the rachillæ, the cream-colored flowers in triads or pairs in loose spirals or, in var. *rostrata*, densely spiralled below, subdistichous or distichous above, the bractlets 2-4 mm. or more long; staminate flowers 3-6 mm. long, the sepals 1.5-2 mm. high, stamens 8-22; pistillate flowers 4-5 mm. high,

* In Kerchove, Les Palmiers, 250, 1878, Wendland lists *Chamærops fenestrata*, Hort., *Geonoma* [*fenestrata*], Hort., and *Chamædorea* [*fenestrata*], Hort. in the synonymy of *Malortiea gracilis*. These names, so far as I know, have never been validated with descriptions nor is their position within the species ascertainable though they may have referred to material that would be assigned to var. *rostrata* as the species is treated here.

Two illustrations are cited by Index Londinensis for *Malortiea gracilis* but cannot be referred with certainty to variety. They are found in Bot. Mag. lxxxviii, pl. 5291 (1862) and Ill. Hort. ix, pl. 327 (1862), the latter adapted from the former. Burret referred the plant figured to *R. gracilior* (op. cit. p. 554). The general aspect and 4-nerved lower pinnæ suggest var. *rostrata* to me but without fruit it is not possible to refer it definitely. Stamens are figured as 9 but are described as 10-12 in Hooker's accompanying text. Similarly, the plant figured as *M. simplex* in The Florist and Pomologist, 1873, 205, probably belongs here.

the sepals 2-2.5 mm. high, petals 4-5 mm. high, staminodes ca. 9, connate and adnate to the petals for about 1-2 mm. then produced in subulate teeth 1-2 mm. long, the pistil ovate to columnar with 3 subbasal ovules: fruit 12-16 mm. long, 6-8 mm. in diameter, black at maturity, obovoid, the apex with a low apiculate crown or, in var. *rostrata*, with a truncate umbo 2 mm. high, the ovoid seed attached basally, 8-10 mm. long, 6 mm. in diameter, shining red-brown with few simple or furcate vascular strands descending from the apex, endosperm homogeneous but often discolored marginally and with intrusions to 1 mm. deep below the vascular strands.

A polymorphic species of four varieties distributed from southern Mexico to eastern Costa Rica.

Key to varieties of Reinhardtia gracilis

1. Stamens 16-22; staminate flowers 5-6 mm. long when mature.
   2. Leaves large, with 14-22 nerves on each side of a rachis 11-23 cm. long, the ligule 3-4 cm. long; rachillæ 6-11, the lower often furcate or branched, 7-29 cm. long with 16-40 flowering nodes. British Honduras, Guatemala, and Honduras ..... var. *gracilis*
   2. Leaves small, with 8-9 nerves on each side of a rachis 3.5-5.5 cm. long, the ligule 1 cm. long; rachillæ 2-3, simple, 4-5 cm. long bearing 8-17 flowering nodes. Oaxaca, Mexico ..... var. *tenuissima*
1. Stamens 8-10; staminate flowers 3-4 mm. long when mature.
   3. Fruit with a low apiculate crown; flowering nodes 6-17 arranged in a loose spiral; leaves with 8-11 nerves on each side of the rachis. Southern Mexico to Honduras ..... var. *gracilior*
   3. Fruit with a prominent truncate umbo 2 mm. long; flowering nodes 16-37 arranged in a dense spiral at the base of the rachillæ, subdistichous or distichous above or sometimes throughout; leaves with 11-15 nerves on each side of the rachis. Eastern Nicaragua and Costa Rica ..... var. *rostrata*

In general, there is essential uniformity in the fruit and seed of subgenus Malortiea. Specific characters are found in the type of inflorescence, in the number of stamens, and in the character of the foliage. As I define *Reinhardtia gracilis*, neither inflorescence nor number of stamens sets it apart from *R. simplex* and *R. Koschnyana* but the deeply bifid leaf-apices and fenestrate pinnæ are unfailing marks of identification. The last-named species with non-fenestrate shallowly bifid leaves are amply distinct from each other in several characters though more or less coinciding in distribution. They appear to be relatively stable species.

In contrast, though the foliage is distinctive, *R. gracilis* appears to be a polymorphic species divisible into subordinate taxa. Were it not for the specimen described as var. *tenuissima*, I would perhaps have maintained two species despite the very considerable amount of variation and overlap in foliage—*R. gracilis* with 16-22 stamens and large leaves, *R. gracilior* and a variety with 8-10 stamens and generally smaller leaves. Lacking flowers, the type of var. *tenuissima* would have been referred to *R. gracilior* with little hesitation because of its dwarf habit and small few-nerved leaves, yet the staminate flowers are those of *R. gracilis* in size and number of stamens.

Quantitative variation of foliage far exceeds that known for any other species of the genus but qualitative uniformity suggests caution in the recognition of variants on a specific level. Working with leaves alone it is possible to cross-match foliage of varieties. Four leaf types are recognizable in var. *rostrata*. Leaves of *Standley & Valerio 48990*, representing the lowland (and typical) form from Nicaragua and the lower Reventazón Valley of Costa Rica, are distinguishable from leaves of *Steyermark 39908* representing var. *gracilis* in Guatemala only by the presence of an added nerve in the upper pinnæ (10 vs. 9), somewhat longer petioles, and differences of 0.5 and 2.5 cm. in the length of the leaf-rachis—and these in a variety generally much less robust than var. *gracilis*. Foliage of *Moore 6703* from Turrialba with smaller leaves agrees essentially with that of *Moore & Cetto 6265* from Mexico representing a robust phase of var. *gracilior*, again differing by a single nerve in the lower pinnæ and 1 cm. in length of the rachis. Leaves of *Pittier 8179* and *Standley & Valerio 47196, 47241* representing a dwarf Costa Rican phase are in accord with leaves of *Mell 511* from Mexico and *Wilson 120* from Honduras representing var. *gracilior* and with *Hernandez & Sharp X-1291* representing var. *tenuissima*.

A consideration of panicle, flowers, and fruit allows the segregation of taxa not otherwise separable. On the basis of staminate flowers, varieties *gracilis* and *tenuissima* with 16-22 stamens can be distinguished from varieties *gracilior* and *rostrata* with 8-10 stamens, unless new collections provide intermediate stamen numbers. Without fruit, however, it is not easy to distinguish vars. *gracilior* and *rostrata* with certainty, an example being *Yuncker, Koepper & Wagner 8330*, referred here with question to var. *gracilior* but first determined as *R. rostrata*. Variety *tenuissima* is readily distinguished from var. *gracilis* in habit though not from var. *gracilior* as previously noted.

Immature fruits of var. *rostrata* and of robust forms of var. *gracilis* are indistinguishable. Both have a prominent hard white umbo at the apex. In var. *rostrata* the umbo remains conspicuous at maturity, in var. *gracilis* it becomes flattened. A similar though lesser umbo is found in immature fruit of var. *gracilior* and of fruit presumed to belong to var. *tenuissima*. At maturity, both varieties *gracilis* and *gracilior* lack a prominent umbo and are ordinarily distinguishable only by very slight difference in size. Even that criterion fails if *Williams 9494* has been referred correctly to var. *gracilior*.

The size, branching, and number of flowering nodes on rachillæ in the panicle vary substantially even within varieties. In general, var. *gracilis* has large panicles with slender often furcate or branched rachillæ and numerous nodes as opposed to shorter stouter rachillæ with fewer nodes in vars. *tenuissima*, *gracilior*, and *rostrata*. These differences are unreliable when sufficient material is studied. Variety *rostrata* is ordinarily distinct

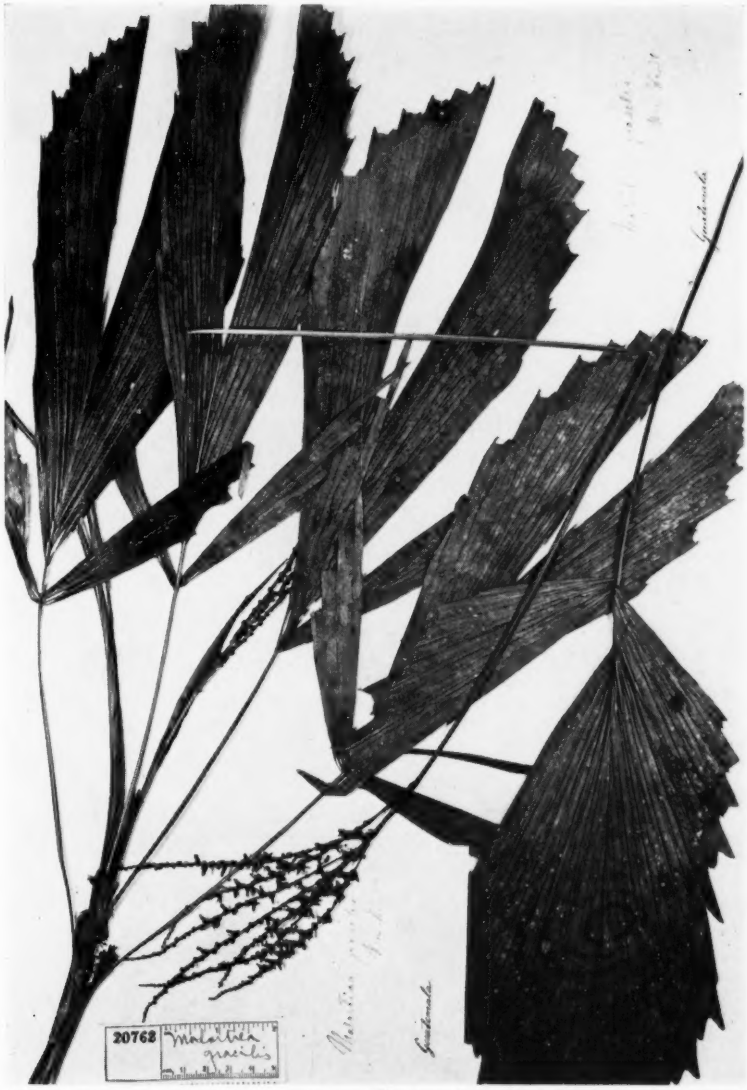
from others, if the exceptional panicle (*Boynton 3B*) is overlooked, in that the flowering nodes are usually close-set and subdistichously or distichously arranged above the base.

It would be of interest to know something of the cytology and genetics of these variants and, indeed, whether the true distribution is effectively represented by the collections at hand. Faced with the interlocking variation, lack of complete collections, and comparing the multiplicity of forms that have fenestrate leaves with other apparently more stable species, I am compelled to regard *R. gracilis* as a polymorphic assemblage of incipient species, none of them comparable to *R. simplex* or *R. Koschnyana*. Some will undoubtedly wish to recognize the subordinate taxa as species. I have been tempted to do the same but have refrained from violating a personal and necessarily subjective concept of the evolution of Reinhardtia. The conclusions recorded here are at best preliminary. They reflect inadequate material and suggest a problem for future study. An outline of variation within the species or species complex has been traced but tantalizing questions still remain.

Reinhardtia gracilis var. **gracilis.** Figs. 157B, 158C, 159A, 163.

Stems 1-2.4 m. high, 7-14 mm. in diameter: leaves with 14-22 nerves on each side of the rachis, the lower pinnæ 4-7-nerved, 14.5-25 cm. long, 3-6.5 cm. wide, the upper pinnæ 9-16-nerved, 13.5-22 cm. long on the upper margin, 12-23 cm. long on lower margin, 6.5-15 cm. wide, the petiole 17-60 cm. long, the rachis 11-23 cm. long, the ligule 3-4 cm. long: panicle with 6-11 rachillæ 7-29 cm. long bearing 16-40 flowering nodes in a loose spiral, the lower rachillæ often furcate or branched; staminate flowers 5-6 mm. long with 17-22 stamens: fruit 14-16 mm. long, 6-8 mm. in diameter, the apex with a low apiculate crown at maturity but often prominently pale umbonate when immature.

British Honduras, Guatemala, and Honduras at altitudes up to 600 m., type *Kegel* (HAN, destroyed, photo F neg 20672, BH, GH, US). British Honduras: Pueblo Viejo, ca. 520 m. alt., January 26, 1934, *Schipp S-523* (NY), February 15, 1934, *1255* [S-594] (A, BM, GH, K, MO, US UC). Guatemala: without precise locality, *Kegel s.n.* (HAN, type destroyed, photo F neg. 20672, BH, GH, US); eastern portions of Vera Paz and Chiquimula, 1885, *S. Watson 499* (BH, GH); Dept. Izabel, Escoba, across the bay (west) from Puerto Barrios, near sea level, May 3, 1939, *Standley 72880* (F), *73020* (F); along trail beginning from mile 33.23 between Dartmouth and Morales toward Lago Izabel, Montaña del Mico, 35-150 m. alt., April 7, 1940, *Steyermark 39036* (F); south-facing lower ridges of Cerro San Gil (El Armitaño) opposite Cayuga, 30-500 m. alt., April 15, 1940, *Steyermark 39492* (F); along Río



163. REINHARDTIA GRACILIS var. GRACILIS. The type formerly at Hannover. Photograph by J. F. Macbride courtesy Chicago Natural History Museum.

Frío, Cerro San Gil, alt. 75 m., December 17, 1941, *Steyermark 39908* (F, NY). Honduras: Dept. Atlántida, near Tela, Lancetilla Valley, 20-600 m., May 5, 1953, *Moore 6783* (BH); December 6-March 20, 1928, *Standley 52617* (A, F, US), *56774* (F, US); July 16, 1934, *Yuncker 4617* (A), August 11, 1934, 91.5 m. alt., *4990* (A, F, MO); slopes of Mt. Cangrejal, near the Danto River, 335 m. alt., July 16, 1938, *Yuncker, Koepper & Wagner 8475*, (F, GH, MO, NY, US).

The type of *R. gracilis* is presumed to have been destroyed during World War II. I have interpreted the typical variety on the basis of the type photograph, Wendland's excellent detailed description, and subsequent collections from British Honduras and Guatemala. The latter all lack staminate flowers hence I have not been able to verify Wendland's description of the stamens. Staminate flowers from Honduran collections cited here agree with Wendland's account except that I have found only 17-19 stamens where Wendland counted 18-22.

Variety *gracilis*, like varieties *gracilior* and *rostrata*, is variable. Collections from British Honduras and Guatemala are less robust with smaller leaves and panicles than specimens from Honduras. No clear-cut distinction can be drawn, however, as may be seen from the comparison below. Immature fruit, especially from Honduran collections, is remarkably similar to that of var. *rostrata* but the pale umbo becomes obscure at maturity.

British Honduras and Guatemala: Leaves with 14-17 nerves on each side of a rachis 11-14 cm. long; lower pinnæ 4-5-nerved, 14.5-20 cm. long, 3-4.3 cm. wide; upper pinnæ 9-12-nerved, 13.5-20 cm. long on upper margin, 12-17.5 cm. long on lower margin, 6.5-10.5 cm. wide; petiole 17-40 cm. long: panicle with 6-9 rachillæ 7-14.5 cm. long, these simple, furcate, or more rarely branched, the flowering nodes 18-36. *Kegel s.n., Schipp S-523, 1255, Standley 72880, 73020, Steyermark 39036, 39492, 39908.*

Honduras: Leaves with 17-22 nerves on each side of a rachis 12.5-23 cm. long; lower pinnæ 5-7-nerved, 18.5-25 cm. long, 3.5-6.5 cm. wide; upper pinnæ 12-16-nerved, 18.5-22 cm. long on upper margin, 19.5-23 cm. long on lower margin, 8.5-15 cm. wide; petiole 40-60 cm. long: panicle with 8-11 or more rachillæ (7-)12-29 cm. long, the lower usually furcate or branched, flowering nodes (16-)30-40. *Moore 6783, Standley 52617, 56774, Yuncker 4617, 4990, Yuncker et al. 8475.*

Reinhardtia gracilis var. **tenuissima,** H. E. Moore, in Principes, i, 140, 145 (1957). Figs. 158D, 159B, 164.

Stems to 1 m. high, 5 mm. in diameter: leaves with 8-9 nerves on each side of the rachis, the lower pinnæ 3-nerved, 8.5-12.5 cm. long, 1.3-1.8 cm.

164. REINHARDTIA GRACILIS var. TENUISSIMA. The type specimen at the Bailey Hortorium.

wide, upper pinnæ 5-6-nerved, 9.5-11 cm. long on the upper margin, 9-11.5 cm. long on the lower margin, 2.8-4.2 cm. wide, the petiole 11-19 cm. long, rachis 3.5-5.5 cm. long, the ligule 1 cm. long, of brown to blackish fine loosely woven fibers: panicle with 2-3 slender simple rachillæ 4-5 cm. long bearing 8-17 flowering nodes in a rather close spiral; staminate flowers 5 mm. long with 16-17 stamens.

Mexico: Oaxaca; Finca "La Gloria" north of Niltepec, 1000-1250 m. alt., April 3, 1946, *E. Hernandez Xolocotzi & A. J. Sharp X-1291* (BH, type).

The type of var. *tenuissima* was referred to var. *gracilior* at first glance but dissection of staminate flowers revealed a significant difference in size and number of stamens. I consider the variety allied to var. *gracilis* though readily distinguished in vegetative characters. Association of this small-leaved variety with the typical variety is not difficult when the variation demonstrated in var. *rostrata* is considered. Hernandez and Sharp collected two other palms in the same region. One, *Reinhardtia elegans*, generally occurs at altitude of 1000 meters or more and is thus far known only from the mountains of Oaxaca and Chiapas; the other, *Synechanthus mexicanus*, is known only from this locality. It is not surprising, therefore, to find that this dwarf Reinhardtia is distinct from lowland forms.

No fruit is present on the type collection. There is, however, a specimen of a dwarf Reinhardtia with immature fruit in the general herbarium at Bruxelles and a duplicate at Leiden. This material, which I had previously associated with var. *gracilior*, was collected at an altitude of about 915 meters (3000 feet) at Tepinapa, Oaxaca (*Galeotti 4983*, BR). It seems likely from the locality (not far distant from the type locality of *R. elegans*) that the specimens represent var. *tenuissima*. This conclusion is borne out by the dwarf habit, similar foliage, and above all by the ligule which is even shorter than that of the type but with the same very loosely woven fine dark fibers. The short-pedunculate panicle at Bruxelles has four rachillæ to 4.8 cm. in length with 10 or fewer flowering nodes. Fruit, in which the seed is only partially formed, measures 12 mm. in length, 6 mm. in diameter. It resembles fruit of var. *gracilior* and is tipped with a pale apiculate stylar cap 1 mm. long which probably becomes obscure at maturity. Further collections are required to complete the description of var. *tenuissima* with certainty. Since there are no staminate flowers on the Galeotti collection it is necessarily referred here with reservation.

Reinhardtia gracilis var. **gracilior,** (Burret) H. E. Moore, in Principes, i, 140, 145 (1957). Figs. 158E, 165.

Reinhardtia gracilior, Burret, in Notizbl. Bot. Gart. Berlin, xi, 555 (1932); Standl. & Record, in Field Mus. Nat. Hist. Bot. Ser. xii, 86 (1936); Bailey, in Gent. Herb. viii, 191 (1949).

Stems to 1 m. high, 4-7 mm. in diameter: leaves with 8-11 nerves on each side of the rachis, the lower pinnæ 3-4-nerved, 8.5-12 cm. long, 1.8-3.2 cm. wide, the upper pinnæ 5-8-nerved, 8.5-15 cm. long on the upper margin, 7.5-14.5 cm. long on the lower margin, 3-3.5 cm. wide, the petiole 7-25 cm. long, rachis 3.5-6 cm. long, ligule 1.5-2.5 cm. long: panicle with 3-6 rachillæ 2.5-8.5 cm. long bearing 6-17 flowering nodes in a loose spiral, rachillæ all simple or exceptionally the lowermost furcate; staminate flowers 3-3.5 mm. long with 8-10 stamens: fruit 12-14 mm. long, 7-8 mm. in diameter, the apex with a low apiculate crown.

165. REINHARDTIA GRACILIS var. GRACILIOR. A plant growing along banks of the Coatzacoalcos River at Buenaventura, Veracruz, Mexico. Photograph courtesy Plant Introduction Section, United States Department of Agriculture.

Southeastern Mexico, British Honduras and Honduras at low altitudes, type *Schipp 8369* (B, destroyed). Mexico: Chiapas; between Solosuchiapa and Pichucalco, January 19, 1907, *Cook & Doyle 256* (US): Oaxaca; Ubero, 30-90 m. alt., May, 1937, *L. Williams 9330* (F, US) and June, 1937, *9494* (F): Veracruz; Buenaventura, December, 1906, *O. F. Cook 4* (US); near Cerro Nopo & Cerro Campana (between Cerro Mono Blanco & Cerro Tapalcapan) northwest of Catemaco, August 8, 1953, *Dressler & Jones 37* (NY); Coatzacoalcos River, *J. C. Harvey s.n.* (K); Dos

Rios, March 14, 1930, *Mell 511* (NY, US); between Catemaco and Zontecomapan on road to Montepío, April 11, 1952, *Moore & Cetto 6265* (BH); Fortuño, Coatzacoalcos River, 30-50 m., March, 1937, *L. Williams 8315* (F, US), *8668* (F) and April, 1937, *8999* (F), *9006* (F, US). British Honduras: Stann Creek Valley, 100 m. alt., April 12, 1932, *W. A. Schipp 8369* (B, type destroyed). Honduras: Dept. Atlántida; near Bolet's plantation, Puerto Sierra, January 20, 1903, *Wilson 120* (NY); near Elliott's plantation, January 21, 1903, *Wilson 120* (US); near Danto River, Mt. Cangrejal, back of Ceiba, August 6, 1938, *Yuncker, Koepper & Wagner 8830* (F, GH, NY, US).

The type of var. *gracilior* was destroyed at Berlin during World War II. I have seen no isotypes in European or American herbaria. Interpretation of the species is based on Burret's description and on other collections that appear to represent the same taxon, none unfortunately from British Honduras. No neotype has been designated for it would be preferable to attempt recollection of this species at the type locality.

Foliage varies in variety *gracilior* but not to the extent nor with the constancy that it does in var. *rostrata*. Leaves of some collections are similar to those of var. *rostrata* in the vicinity of Turrialba; those of others approach var. *tenuissima*. In *Yuncker et al. 8830* nearly the whole range appears in the four specimens studied.

I have referred some collections here with hesitation. *Williams 9330* and *9494* from Ubero, Oaxaca, seem very close to var. *tenuissima*. Staminate flowers are not available but the fruit measures 14 mm. long, 7 mm. in diameter and, though nearly mature, has a pale pyramidal apiculate umbo about 1 mm. high. Fruit from other collections is generally 12-13 mm. long, 7-8 mm. in diameter with a lower blunter umbo when mature. The difference in fruit is slight when a series is examined. The Williams collections are from low elevations in the drainage of a minor stream flowing into the northward-draining Coatzacoalcos River not far from Dos Rios, Veracruz, where undoubted var. *gracilior* occurs (*Mell 511*).

Specimens from Honduras (*Yuncker et al. 8830*) are also referred here with reservation. They were originally determined as *R. rostrata* but the specimens I have seen are in flower only. The loosely spiralled flowering nodes and small leaves indicate relationship with var. *gracilior*.

Plants grown from seed collected in the vicinity of La Gloria, Oaxaca, (type locality for var. *tenuissima*) are now cultivated in California and in Florida. The original collection was made by T. MacDougall from the area between Mogoñé and El Modelo at an altitude some 300 meters or more below La Gloria (private communication). Foliage of living material and the lower altitude suggest that these plants belong with var.

gracilior. Until staminate flowers can be examined, however, the possibility of identity with var. *tenuissima* cannot be ruled out.

Williams (*8315*) notes the species as fairly common in deep forest and gives the vernacular names "Coquito", "Coyolito" or "Tepejilote" for it.

Reinhardtia gracilis var. **rostrata,** (Burret) H. E. Moore, in Principes, i, 140, 145 (1957). Figs. 157C, 158F, 159G, 166.

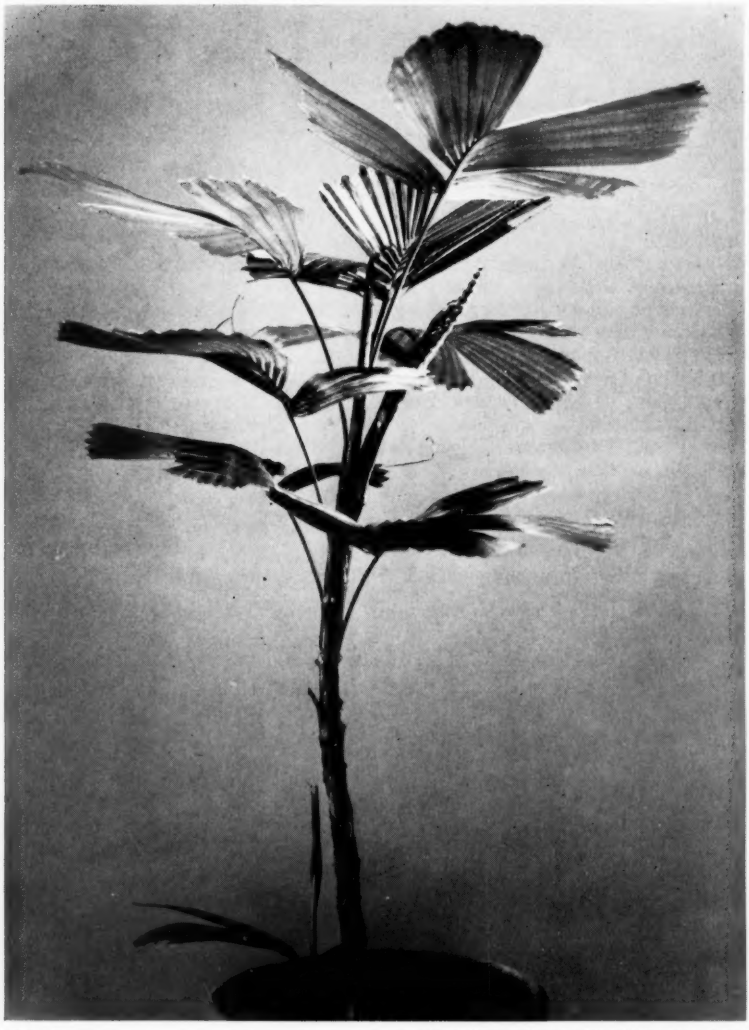
Reinhardtia rostrata, Burret, in Notizbl. Bot. Gart. Berlin, xi, 554 (1932), nomen and in Ann. Naturhist. Mus. Wien, lxvi, 228 (1933); Standl. in Field Mus. Nat. Hist. Bot. Ser. xviii, 125 (1937).

Malortiea rostrata, (Burret) Bailey, in Gent. Herb. vi, 260 (1943).

Stems to 1.5 m. high, 9 mm. in diameter: leaves with 11-15 nerves on each side of the rachis, the lower pinnæ 3-5-nerved, 12-19 cm. long, 2.5-4.5 cm. wide, upper pinnæ 8-10-nerved, 10.5-19 cm. long on upper margin, 9.5-19 cm. long on lower margin, 3.5-9.5 cm. wide, the petiole 14-34 cm. long, rachis 3.8-11.5 cm. long, ligule 2-2.5 cm. long: panicle with 2-6 simple rachillæ 4.5-14.5 cm. long bearing 16-37 flowering nodes in a dense spiral below, densely subdistichous or distichous above or nearly throughout; staminate flowers 3-3.5 mm. long with 8-10 stamens: fruit 12-13 mm. long, 6 mm. in diameter, the apex with a stout truncate umbo 2 mm. high at maturity, the umbo pale and prominent when immature.

Eastern Nicaragua and Costa Rica, type *Cufodontis 700*. Nicaragua: without locality, 1867, *Seemann 162* (BM); Dept. Bluefields, region of Braggman's Bluff, open forest near south bank of Ocongwas River at Camp no. 23, 1928, *Englesing 192* (F): Dept. Chontales; vicinity of La Libertad, 500-700 m. alt., May 29-June 1, 1947, *Standley 9076* (F); without locality, 1867-8, *Tate 422(380)* (BM, K). Costa Rica: Prov. Alajuela; plains of San Carlos, 100 m., April 13, 1903, *Cook & Doyle 64* (NY, US), April 14, 1903, *69* (NY, US) and April 15, 1903, *91* (US): Prov. Cartago: near bottom of El Chino path by Turrialba River before junction with Reventazón, alt. ca. 550 m., August, 1954, *K. T. Boynton 3* (BH); path from Inter-American Institute to Río Reventazón, August 3, 1954, *Boynton 3B* (BH); valley of the Río Reventazón near Inter-American Institute of Agricultural Sciences, 3 km. southeast of Turrialba, 500-600 m., alt., 1949, *Holm & Iltis 108* (F, MO); Turrialba, 1945, *A. C. & M. Langlois 13* (BH), Turrialba, Reventazón, 1922, and 1930, *Lankester s.n.* (K); vicinity of Turrialba, April 24-26, 1906, *Maxon 176* (NY); trail from Inter-American Institute to Río Reventazón, April 14, 1953, *Moore 6703* (BH); bois de la vallée du Río Luis, 600 m., alt., September, 1893, *Pittier 8179* (BH, BR); Pejivalle, 900 m., alt., February, 1926, *Standley*

& *Valerio 47196* (US), *47241* (F, US): Prov. Limon; La Castilla-Los Negritos, 9 km. ab ore fluminis Reventazón, 20 m. alt., May 1, 1930, *Cufodontis 700* (F, neotype; B, type destroyed, W isotype



166. REINHARDTIA GRACILIS var. ROSTRATA. A plant from Costa Rica introduced by R. G. Wilson and grown at Longwood Gardens. The panicle is just emerging from the bracts. Longwood Gardens photograph by G. Hampfler.

destroyed, photo F neg. 30904, BH, GH, US); uber Siquirres, December 8, 1931, *Kupper 113* (M); forets de Río Hondo, Santa Clara, 150-300 m., June 1903, *Pittier 16921* (US), *17128* (K); Hamburg Finca on the Río Reventazón below Cairo, 55 m. alt., *Standley & Valerio 48878* (US, photo F); Finca Montecristo on the Río Reventazón, 25 m. alt., February, 1926, *Standley & Valerio 48948* (F, US), *48975* (US), *48990* (F, US).

Cultivated: California; Doheny Estate, Los Angeles, November, 1912 (US).

The type and at least two isotype collections of this variety were destroyed during World War II according to communication from Prof. Dr. G. Cufodontis. Fortunately an isotype is still in existence at the Chicago Natural History Museum. This specimen may be designated as neotype. The cultivated specimen cited consists of a single leaf which can be referred here only tentatively. The presence of *R. simplex* in the same gardens suggests that both were introduced from Costa Rica.

Although uniform in fruit and arrangement of flowering nodes, the variety demonstrates four foliage phases. The typical phase from the lowlands of Nicaragua and the lower Reventazón Valley resembles var. *gracilis* as previously noted. A phase with smaller and usually trijugate leaves occurs in the low plains of San Carlos. In the vicinity of Turrialba, Costa Rica, and La Libertad, Nicaragua, at 500-600 m. elevation, a third phase with smaller leaves much resembling those of one phase of var. *gracilior* is abundant. A fourth phase from altitudes of 700-900 m. in Costa Rica has foliage scarcely separable from var. *tenuissima*. These differences with accompanying reference to collections are tabulated below.

Typical: Leaves with 2-3 pinnæ and (11-)13-15 nerves on each side of a rachis 6-11 cm. long, lower pinnæ 3-5-nerved, 14.5-21 cm. long, 2.5-5.3 cm. wide; intermediate, when present, 2-3-nerved, 19-21 cm. long, 2.5-4 cm. wide; upper pinnæ 6-10-nerved, 13-18.5 cm. long on upper margin, 13.5-18.5 cm. long on lower margin, 4.5-9.5 cm. wide; petiole 26-34 cm. long: panicle with 2-6 rachillæ 10.5-14.5 cm. long, flowering nodes 14-37. *Cufodontis 700, Englesing 192, Pittier 16921, Standley & Valerio 48878, 48948, 48975, 48990.*

San Carlos: Leaves with 3-4 pinnæ and 13-15 nerves on each side of a rachis 7.5-9.5 cm. long; lower pinnæ 3-5-nerved, 13-15.5 cm. long, 2.5-3.7 cm. wide; intermediate 1-5-nerved, 14-17.5 cm. long, 2.8-4 cm. wide; upper 5-8-nerved, 11-14.5 cm. long, 3.2-4.8 cm. wide; petiole 15-26 cm. long: panicle with 4 rachillæ 6.5-9 cm. long, flowering nodes 16-19. *Cook & Doyle 64, 69, 91.*

Turrialba and Nicaragua: Leaves with 2 pinnæ and 12-13 nerves on

each side of a rachis 4.7-7.5 cm. long; lower pinnæ 4-5-nerved, 11.5-13.5 cm. long, 3.2-4 cm. wide; upper pinnæ 8-nerved, 11-12.5 cm. long on upper margin, 11.5-12 cm. long on lower margin, 4.9-7 cm. wide; petiole 15-22.5 cm. long: panicle with 3-5 rachillæ 3.8-13 cm. long, flowering nodes 8-21. *Boynton 3, 3B, Holm & Iltis 108, Langlois 13, Maxon 176, Moore 6703, Standley 9076.*

Pejivalle and Río Luis: Leaves with 2 pinnæ and 10-11 nerves on each side of a rachis 3.3-4 cm. long; lower pinnæ 3-4-nerved, 12-13.5 cm. long, 2.1-3 cm. wide, upper pinnæ 6-7-nerved, 11-12.5 cm. long on upper margin, 11.5-12 cm. long on lower margin, 3.4-4.5 cm. wide; petiole 20.5-22 cm. long: panicle with 2-4 rachillæ 4.3-9.5 cm. long, flowering nodes 10-32. *Pittier 8179, Standley & Valerio 47196, 47241.*

4. **Reinhardtia simplex,** (Wendl.) Burret, in Notizbl. Bot. Gart. Berlin, xi, 554 (1932); Standl. in Field Mus. Nat. Hist. Bot. Ser. xviii, 125 (1937); Moore in Principes, i, 142 (1957). Figs. 158G, 159C, 167.

   Malortiea simplex, Wendl. in Bot. Zeit. xvii, 5 (1859); Kerchove, Les Palmiers, 250 (1878); Bot. Mag. lxxxvii, pl. 5247 (1861); Hemsl. in Godman & Salvin, Biol. Cent. Amer. Bot. iii, 402 (1885); Bailey, in Gent. Herb. vi, 261, fig. 138 (1943); Bailey, in Ann. Missouri Bot. Gard. xxx, 391, fig. 68 (1943).

Stems erect, a few together or appearing solitary but late-suckering, to 1.2 m. high or slightly more (or to 4.4 m. fide von Wedel), brown, naked, and 4-7 mm. in diameter below, sheathed in upper portion with 8-20 leaves, the sheaths 5.5-8 cm. long, ligule 1.5-2 cm. long; petiole 7-16 cm. long, noticeably continued through the sheath as a pale thick line, rounded and wing-margined below where pale and clothed with appressed deciduous brown scales, at length becoming brown-dotted with persistent scale-bases, green and flat above, the rachis 12-20 cm. long, pale, rounded and minutely brown-dotted or lepidote below, green and very slightly keeled and flexuous above, seedling leaves deeply divided at the apex and with about 4 nerves on each side of the rachis, the mature blade simple, elliptic, and 16-21 cm. long, (4.5-)7-12 cm. wide, (8-)10-12-nerved or more frequently bijugate, the lower pair of leaflets oblanceolate with a very obliquely toothed tip, (7-)12-15 cm. long, 1.5-4 cm. wide, 3-4-nerved, the terminal segments united in a broadly elliptic or obovate, toothed flabellum with 7-8 nerves on each side cleft for 1-2.5(-4) cm. at the apex, (11-)15-19(-21) cm. long, 5.8-8.5(-12) cm. wide, dull to somewhat glossy bright green and glabrous above (in vivo), paler, duller and minutely brown-dotted below, nerves slightly keeled above, pale below where clothed with deciduous brown lepides: inflorescence a panicle of 3-7 short rachillæ 3.0-8.5 cm. long, these unbranched or very rarely the lowermost furcate, at first rather densely clothed with appressed red-brown fringed scales, at length subglabrous and inconspicuously brown-dotted, outer bract included within the sheath, the inner included or exserted for 3-6 cm., both deciduous-brown-lepidote, peduncle attaining a length of 35-45

167. REINHARDTIA SIMPLEX. The type formerly in the herbarium at Vienna. Photograph by J. F. Macbride courtesy Chicago Natural History Museum.

cm. in robust plants, with deciduous red-brown scales, rachis 0.5-3.5 cm. long, occasionally with the rachillæ subdigitate, flowers borne at 6-18 nodes in a loose spiral, each node subtended by an ovate to lanceolate striate bractlet 2-4(-10) mm. long; staminate flowers 3.5-4 mm. long, the sepals ca. 1.5 mm. high, minutely denticulate on the margins, petals acute, striate when dry, stamens (12)-14-19,* the filaments short, the anthers sagittate basally, obtuse, emarginate, shortly bifid or rarely acute at the apex; pistillate flowers ca. 3 mm. high (in bud): fruit (11-)12-15 mm. long, 7-9 mm. in diameter, green, maturing black, obovoid, very shortly apiculate at the apex, tapered to the base, subtended by a perianth of petals 4-4.5 mm. high, sepals ca. 2.5 mm. high; seed oblong-ellipsoid, 7-8 mm. long, 5-6 mm. in diameter, the shining red-brown testa with few impressed vascular strands, endosperm homogeneous but with minute marginal impressions under the vascular strands.

Honduras to Panamá; type *Friedrichsthal s.n.* (W, destroyed, photo F neg. 29904, BH, GH, US). Honduras: Dept. Atlántida; vicinity of San Alejo, 150-270 m., at base of hills south of San Alejo near Río San Alejo, April 22-27, 1947, *Standley 7937* (F, US); rocky ravine near Puente Alto stop on S.F. Co. RR east of Ceiba, 243 m., July 19, 1938, *Yuncker, Koepper & Wagner 8518* (F); Dept. Colon, Guarunta, Wispernini Camp, 15-22.5 m., March 23, 1938, *C. & W. von Hagen 1381* (F, NY). Nicaragua; Dept. Chontales; Chontales, 1867, *Seemann 161* (BM, K); Dept. Zelaya, guamil o breñas sobre áreas pantanosas a lo largo del Río Grande, 0.15 m., April 10, 1949, *A. Molina R. 2137* (F, GH); vicinity of El Recreo on Río Mico, about 30 m. alt., April 23-May 14, 1949, *Standley 19719* (F), *19775* (F), *19842* (F). Costa Rica: without locality, eastern Costa Rica, 1841, *Friedrichsthal s.n.* (W, type destroyed, photo BH, GH, US, F neg. 29904): Prov. Alajuela; plains of San Carlos, 100 m., April 15, 1903, *Cook & Doyle 83, 87* (US); Villa Quesada, Canton San Carlos, 825 m., March 14, 1939, *A. Smith 1743* (F, MO, NY) and March 10, 1940, *P2577* (US); Prov. Cartago; vicinity of Pejivalle, ca. 900 m., February 7-8, 1926, *Standley & Valerio 47257* (US): Prov. Guanacaste; vicinity of Tilarán, 500-650 m., January 10-31, 1926, *Standley & Valerio 44488* (US); El Silencio, near Tilarán, ca. 750 m., January 13, 1926, *Standley & Valerio 44774* (US) and *44844* (F, US); Los Ayotes, near Tilarán, 600-700 m., January 21, 1926, *Standley & Valerio 45642* (F, US); La Tejona, north of Tilarán, 600-700 m., January 25, 1926, *Standley & Valerio 45849* (F, US); Naranjos Agrios, 600-700 m., January 29, 1926 *Standley & Valerio 46386, 46490, 46523* (US); Tilarán, 750 m., March 5, 1923, *J. Valerio 119* (US): Prov. Herédia; east

* Wendland noted 12 stamens. Burret, op. cit. p. 552, reports only 9 stamens for *R. simplex*. I have not been able to verify this number nor have I found 12 as cited by Wendland.

slopes above San Miguel, valley of the Río Sarapiquí, alt. ca. 700 m., March 26, 1953, *Moore 6598* (BH); flum. Sarapiquí, 1857, *Wendland s.n.* (K): Prov. Limon; Río Hondo, plains of Santa Clara, 100 m., May 5, 1903, *Cook & Doyle 547* (US); Jiménez, llanuras de Santa Clara, 200 m., April, 1894, *Donnell-Smith 4987* (US); forest along new tramline beyond bridge over Río Parismina on Finca Siam, July 30, 1936, *C. W. Dodge & V. F. Goerger 9505* (MO); vicinity of U. S. Department of Agriculture Rubber Experiment Station, Los Diamantes on Río Sta. Clara (1.6 km. east of Guápiles), alt. ca. 200 m., July 9, 1949, *R. W. Holm & H. H. Iltis 373* (MO); orillas Río Parismina, May, 1918, *O. Jiménez s.n.* (US); Río Hondo, 100 m., July 5, 1903, *Pittier 2817* (K, US); forêts de Shirores (Talamanca), ca. 100 m., February, 1895, *Pittier & Tonduz 9237* (BH, BR, US); vicinity of Guápiles, 300-500 m., March 12-13, 1924, *Standley 37125* (US); forêts du Zhorquin et de Tsuritkub (Talamanca), March, 1894, *Tonduz 8625* (BH, BR, US); forêts de Tsuritkub, April, 1894, *Tonduz 8727* (BH, BR, US); forêts de Trejos, Las Vueltas, Tucurrique, 635 m., January, 1899, *Tonduz 12977* (US); Hacienda de Zent, *United Fruit Co. 316* (US): Prov. Puntarenas; Palmar Norte, trail to Buenos Aires, alt. 830 m., February 17, 1951, *Allen 5914* (GH, UC, US); forested hills above Palmar Norte, ca. 550 m., March 6, 1953, *Moore 6529* (BH); Pueblo Nuevo de Coto, February 20, 1936, *Valerio 1388* (F). Panamá: western Panamá, Rubber Tree Station, July-August, 1923, *H. E. Stork 116* (US); Marraganti and vicinity, 3-60 m., April 3-9, 1908, *R. S. Williams 1010* (NY): Prov. Bocas del Toro; Changuinola Valley, August 12, 1923, *V. C. Dunlap 116* (F); Water Gap, September 6, 1940, *H. von Wedel 611* (BH); Water Valley, September 23, 1940, *von Wedel 923* (MO); vicinity of Chiriquí Lagoon, October 2, 1940, *von Wedel 1006* (BH, MO): Prov. Darien: forests around Pinogana, April 16-21, 1914, *H. Pittier 6539* (US).

Cultivated: Doheny Estate, Los Angeles, California, November, 1912 (US).

Reinhardtia simplex is widely distributed, occurring at low elevations in rain-forest from Honduras and Nicaragua to Panamá. Ordinarily it forms loose clumps of slender stems about 1 meter high though von Wedel, in field notes accompanying his number *611*, states that it reaches a height of 15 feet. Von Hagen says that the species is known by the vernacular name "Upuká" in Honduras.

Wendland based his description on a Friedrichsthal collection from eastern Costa Rica but erroneously labelled as from Guatemala. The

specimen, formerly in the herbarium at Vienna, was destroyed during World War II but a photograph is reproduced as Fig. 167. I have seen no duplicate material of the collection in other herbaria.

The species was cultivated in European and British glasshouses in the middle of the last century. An illustration of a plant at Kew presented by Wendland appeared in Botanical Magazine for 1861. Plants from Costa Rica are currently being grown in the southern United States and perhaps in the Bahama Islands.

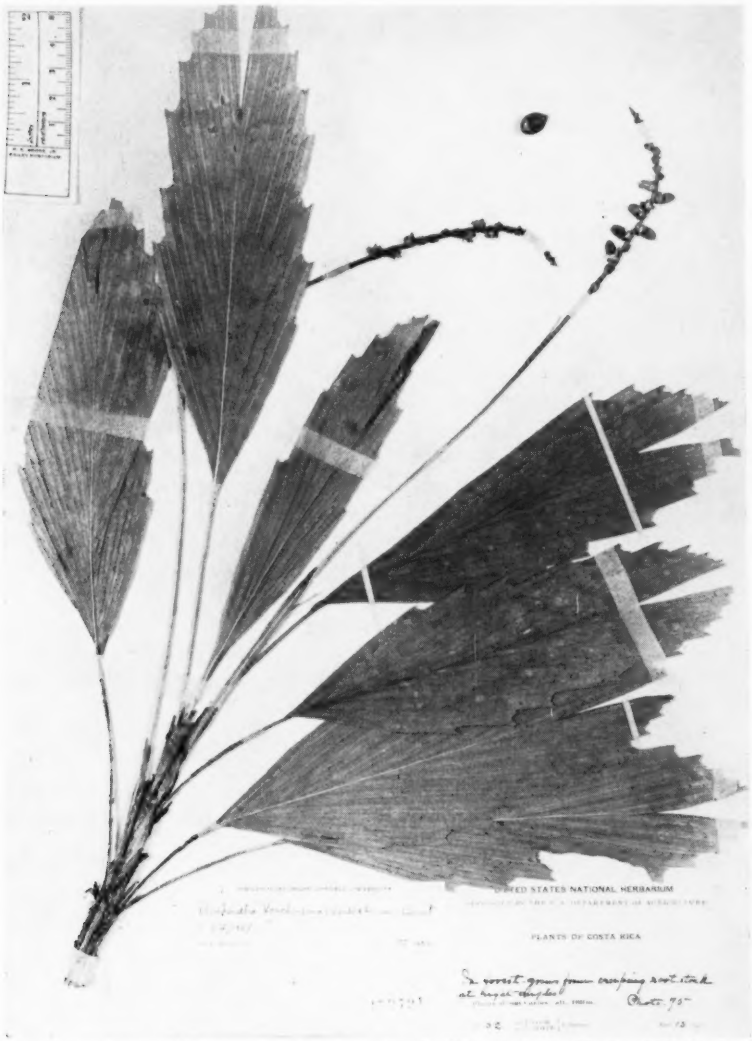
5. **Reinhardtia Koschnyana,** (Wendl. & Dammer) Burret, in Notizbl. Bot. Gart. Berlin, xi, 554 (1932); Standl. in Field Mus. Nat. Hist. Bot. Ser. xviii, 125 (1937); Moore, in Principes, i, 142 (1957). Figs. 158H, 159D, 168.

Malortiea Koschnyana, Wendl. & Dammer, in Gard. Chron. ser. 3, xxix, 341 (1901).

Malortiea pumila, Dugand, in Rev. Acad. Colomb. Ciene. Exact., Fis.-Quim. & Nat. vii, 515-16 (1950).

Stems cespitose from a horizontal rhizome, 4-7 dm. high and sometimes decumbent for as much as 5 dm., shining brown, 4-8 mm. in diameter, sheathed in upper portion with 6-14 leaves, the sheaths ca. 5.5 cm. long, ligule 2 cm. long; petiole 6-12 cm. long, noticeably continued through the sheath as a pale thick line, rounded and pale below where clothed with appressed deciduous brown scales eventually becoming brown-dotted with persistent scale-bases, narrowly winged on the margins, green and flat above, the blade simple, 15-23 cm. long, 6-7.5 cm. wide at broadest point, cuneate-oblong, bifid for (3.5-)4.5-6 cm. at the apex, green and glabrous above, paler below where minutely brown dotted at maturity, the rachis 9-14.5 cm. long, pale and rounded below, keeled and flexuous above, nerves 8-9 on each side of the rachis, continued in a short mucro beyond the blade, keeled above, not prominent below where clothed with subpersistent brown scales, the margins sharply and obliquely toothed: inflorescence spicate, the outer bract included within the sheath, the inner deciduous-brown-lepidote, exserted for 7-8 cm., at first enclosing, then much exceeded by the spike, the peduncle at length to 3.5 dm. long, clothed with deciduous brown scales, the fertile spike 6-8 cm. long, deciduous-brown-scaly and soon appearing glabrous, becoming orange-red or red in fruit, the yellowish-white flowers borne in 17-25 triads of ♂ ♀ ♂ or paired or solitary ♂ near the tip in a loose spiral, each triad or pair of flowers subtended by an ovate-lanceolate strongly striate (when dry) bract ca. 2 mm. long, the rachis, at least basally, shallowly grooved on each side below the triads; staminate flowers ca. 3 mm. long (in bud), the sepals ca. 1.5 mm. high, minutely denticulate on the margins, petals acute, striate (when dry), stamens 8-10, the filaments (in bud) short, the anthers bifid at the base, generally acute at the apex (rarely emarginate or shallowly two-lobed) with the connective often produced in a short mucro; pistillate flowers ca. 3 mm. high (in bud): fruit 11-12.5 mm. long, 6-7.5 mm. in diameter, green maturing purplish-black, obovoid, very

short-apiculate at the apex, tapered to the base, subtended by a persistent indurate perianth of petals ca. 4 mm. high, sepals 2.5-3 mm. high; seed oblong-ellipsoid, 6-7 mm. long, 5-6 mm. in diameter, the dark red-brown testa with few scarcely impressed vascular strands, endosperm homogeneous.



168. Reinhardtia Koschnyana. Specimen in the United States National Herbarium collected on the plains of San Carlos, Costa Rica, by Cook and Doyle in 1903.

Nicaragua to Colombia at low altitudes, type *Koschny s.n.* (B, destroyed). Nicaragua: Dept. Zelaya; matorrales y potreros humedes, drenajes de los Ríos Punta Gorda, Alemán y Zapote, 30 m. alt., December 5, 1951, *Shank & Molina 4972* (US). Costa Rica: Prov. Alajuela; plains of San Carlos, 100 m. alt., April 13, 1903, *Cook & Doyle 52* (US) and April 15, 1903, *90* (US), vicinity of Guatuso de San Rafael on Río Frío, 10° 43′N., 84° 48′W., alt. 80-100 m., August 4, 1949, *R. W. Holm & H. H. Iltis 913* (MO); San Carlos, *Koschny s.n.* fide Burret, (type at Berlin destroyed). Panamá: Prov. Darien; Chepigana Distr., Cana-Cuasi Trail, Camp 1, alt. ca. 243 m., March 18, 1940, *M. E. & R. A. Terry 1620* (F). Colombia: Prov. Antioquia; selva pluvial, carretera al mar, cerca de Villa Ortega, 150 m. alt., December 16, 1948, *F. Lopez & M. J. Sanchez 53* (US); Urubá, Municipio de Mutatá, Villa Arteaga, alt. ca. 44 m., February 16-20, 1953, *R. E. Schultes & I. Cabrera 18707* (BH): Prov. Chocó; Bahía Solano, February 5, 1947, *O. Haught 5535* (COL, holotype of *M. pumila* not seen, BH, US isotypes).

Reinhardtia Koschnyana was first noted in a brief description published in The Gardeners' Chronicle. No definite type or locality was given but the species was distinguished from *R. simplex*, with which it was said to grow, by the spicate inflorescence and somewhat larger leaves paler below and split down at the apex for about 5 cm. Although treated as a name only by Dahlgren in Index of American Palms (Field Mus. Nat. Hist. Bot. Ser. xiv, 201, 1936) and, following him, by Dugand in his discussion of *Malortiea pumila*, the brief description seems adequate. Burret cited a Koschny specimen from San Carlos, Costa Rica, formerly in the herbarium of the Berlin Botanical Garden but now destroyed. This was presumably the type. I have seen no other collections of this species in European herbaria.

More recent collections (*Cook & Doyle 52, 90, Holm & Iltis 913*) from essentially the same region as the Koschny specimen agree well with the published description. If further search fails to reveal a duplicate of the Koschny collection, *Cook & Doyle 52* (US 473791) is suggested as a neotype. In any event, these specimens enable us to interpret the species. Comparison of the Costa Rican specimens with isotype specimens of *Malortiea pumila* and two further collections from Colombia reveals no significant difference. A similar distribution is found in other species of palms. Therefore, *Malortiea pumila* is considered synonymous with *Reinhardtia Koschnyana*. The species is the only one of the genus having a spicate inflorescence. Leaves of *R. simplex* are sometimes undivided as in *R. Koschnyana* but that species can be distinguished by the shortly bifid leaf-apex.

Reinhardtia Koschnyana is known from altitudes of less than 100 meters, or in Panamá to nearly 250 m. In Costa Rica, and presumably elsewhere, it is an undergrowth component of the rain-forest. Haught noted it as growing on steep slopes in forest near sea-level and further commented that it was the smallest palm he had ever seen. Some species of Chamædorea and Pinanga are similarly dwarf but it ranks among the smallest of palms. Within the genus, it appears to represent the end of a reduction series. Of particular interest are the grooves on the spike below the triads on the lower part of the axis, suggesting that bases of branches reduced to a single flowering node have become adnate to the main axis.

EXCLUDED SPECIES

Malortiea intermedia, Wendl. in Kerchove, Les Palmiers, 250 (1878), nomen.

Malortiea lacerata, Hort. ex Wendl. in Kerchove, Les Palmiers, 250 (1878), nomen.

Malortiea simiarum, Standl. & L. O. Williams, in Ceiba, iii, 102 (1952) = **Euterpe simiarum,** (Standl. & L. O. Williams) H. E. Moore, in Principes, i, 145 (1957).

I have examined the type of this species, *Standley 10923* (F). The single panicle bears only pistillate flowers. These have strongly imbricate petals with the apex very shortly valvate. Staminodes are distinct, dentiform, and inserted at the base of the ovary which is unilocular with a solitary laterally attached ovule. Triads of flowers are sessile on the rachillæ and are subtended by a narrow flat bractlet. The species cannot be maintained in Reinhardtia.

Despite the absence of staminate flowers and fruit, *Malortiea simiarum* can be placed satisfactorily in Euterpe as delimited by Burret (Bot. Jahrb. lxiii, 49-76, 1929). It probably belongs in §Leiostachys near *E. longepetiolata*, Oerst. and *E. brachyspatha*, Burret, from which it is distinguished by the very small panicle and by the leaves.

Malortiea speciosa, Hort. ex Wendl. in Kerchove, Les Palmiers, 250 (1878), nomen.

Malortiea Tuerckheimii, Dammer, in Notizbl. Bot. Gart. Berlin, iv, 157 (1904) and 259 (1906) = **Chamædorea Tuerckheimii,** (Dammer) Burret, in Notizbl. Bot. Gart. Berlin, xi, 766 (1933).

Dammer's description of flowering material (p. 259) makes clear the relationship with Chamædorea to which Burret has transferred the species.

Foliage resembles that of *Reinhardtia Koschnyana* superficially but lacks the characteristic sheath, ligule, and indument of Reinhardtia.

Reinhardtia spinigera, Bailey, in Gent. Herb. viii, 191, fig. 81 (1949).

An unfortunate mixture in the type collection (*Schultes 866*, BH) resulted in the description of this species. The infructescence is that of *Reinhardtia elegans*, the foliage is that of a Bactris, probably *Bactris mexicana*, Mart. The species must be rejected under Article 66 of the International Code of Botanical Nomenclature.

INDEX TO VOL. VIII, GENTES HERBARUM

August, 1957

Abies, 9
  alba, 9
  nobilis, 9
    " *glauca*, 77
  procera, 9
    " glauca, 77
Acanthosabal, 211
  cæspitosa, 213
Achimenes, 375
  Ehrenbergii, 375, 395
  lanata, 376
  longiflora, 383
  magnifica, 383
  picta, 377
Achradelpha mammosa, 61
Achras, 61
  lucuma, 61
  mammosa, 60, 61
  Sapota, 59, 60, 61
  Zapota, 59, 60, 61
    " *zapotilla*, 61
  zapotilla, 61
Acmena Smithii, 54
Acælorraphe, 210, 211
  arborescens, 213
  Cookii, 209, 217, 218
  Pimo, 209, 216
  pinetorum, 213
  salvadorensis, 217, 218
  Wrightii, 213
    " *novogeronensis*, 213
Aconitum, 32
  autumnale, 32
  californicum, 32
  Carmichaelii, 32
    " Wilsonii, 32, 80
  Fischeri, 32
    " *Wilsonii*, 80
  Henryi, 32
  Napellus Sparksii, 32
  Spark's, 32
  Wilsonii, 80
Acrocomia, 135-147
  aculeata, 139
  antiguana, 142, 145, 146, 147
  christopherensis, 140, 143, 144, 145
  fusiformis, 135, 139
  grenadana, 144, 145, 148
  lasiospatha, 138, 139
  sclerocarpa, 135, 136, 137, 138
  Viegasii, 139, 140, 141, 142
Actinophlæus Macarthuri, 478
Actinorhytis calapparia, 501
Adonidia, 427, 432, 486, 487
  Merrillii, 477, 486, 501
Æschynanthes Lobbiana, 67
  pulchra, 67
African-Violet, 68
Aguire, 149
Ahrendt, L. W. A., 36
Aiphanes, 164-173
  acanthophylla, 164, 165, 166, 168
  concinna, 223, 224
  corallina, 170
  echinocarpa, 229
  erosa, 164, 165, 166, 169
  Fosteriorum, 225, 226
  gelatinosa, 227, 228
  Kalbreyeri, 229
  Lindeniana, 229
  linearis, 229
  luciana, 165, 166, 167
  minima, 164, 165, 170, 172
  Schultzeana, 229
  vincentiana, 165, 170, 171
Aira capillaris pulchella, 79
  pulchella, 79
Aiton, W., 11
Albizia Lebbeck, 45
Alefeld, F., 349, 354
Allen, Caroline K., 36
  Paul H., 157, 159, 160, 194, 195, 203, 208, 214, 223, 232
Allium, 285
Allogophylla, 388
Aloe barbadensis, 11
  perfoliata vera, 11
  vera, 11
Alston, A. H. G., 6, 7
Alyssum, 37
  argenteum, 37
  murale, 37
Amarella quadrifida, 90
  quinquefida, 90
Amaryllidaceæ, 15
Amaryllis Belladonna, 17, 18
  bulbisperma, 16
  longifolia, 17
  montana, 16
  rosea, 18
  tatarica, 16
  vittata, 18
Amelanchier arborea, 40
  canadensis, 40
  oblongifolia, 40
American Philosophical Society, 295, 482

Amomis acris, 53
caryophyllata, 53
grisea, 53
Amylocarpus, 173
tenuissimus, 177
Andre, E., 386
Andrieux, 248
Andropogon Sorghum sativus caudatus, 79
Androstephium, 264
brevifiorum, 277
cæruleum, 294
Anemone, 33-35
elegans, 35
hupehensis, 34
" japonica, 34
hybrida, 33, 35
Japanese, 33
japonica, 34, 35
" *elegans*, 35
nipponica, 34
vitifolia japonica, 34
Ang, 476
Anneslea amazonica, 30
Anthericum, 246-249
apodastanthum, 247
condensum, 246
crinitum, 248
eccremorrhizum, 246
echeandioides, 246
elatum, 11
eleutherandrum, 246
leptophyllum, 246
leucocomum, 248
macrophyllum, 247
nanum, 247
" *rude*, 248
panamense, 247
platyphyllum, 246
pusillum, 247
Rouwenortii, 11
serotinum, 249
vestitum, 248
Apocynaceæ, 62
Apple, 40
Aquino, Francisco d', 215
Arabis, 37
albida, 37
caucasica, 37
Archbold, Mrs. Anne, 295
Arduini, Pietro, 30
Areca, 428, 432, 449
Cathecu, 449, 477
oleracea, 114, 120, 466
olivæformis, 300
" *gracilis*, 300
Arenaria Biebersteinii, 29
filifolia, 29
graminifolia, 29
Preslii, 29
procera, 29
Arenga Engleri, 428, 477
pinnata, 429, 477
saccharifera, 477
Aretillo, 274
Armoracia lapathifolia, 85, 90
rusticana, 90
Arnott, G. A. W., 50
Arrack Tree, 466
Artocarpus altilis, 27
communis, 27
heterophyllus, 27
incisus, 27
integra, 27
Ascherson, P. F. A., 30
Ashizawa, 477
Askolame, 278
biflora, 287
Asphodelus capensis, 11
Astrocaryum, 147-153
aculeatum, 149, 150, 151, 152
Awarra, 148, 152
Burity, 148
Chambira, 148
Guara, 148
Huaimi, 148
Huicungo, 148
Jauari, 148
Malybo, 148
mexicanum, 149
Munbaca, 148
Murmuru, 148
Paramaca, 148, 152, 153, 154, 155
rostratum, 149
Tucuma, 148
Athanasia annua, 70
Atkins Garden, 481
Atragene japonica, 34
Attalea acaulis, 194
Allenii, 191, 193
exigua, 194
Augustinea, 173
Austrocactus, 322
Austrocylindropuntia, 326
Awarra, 152
Azalea flava, 55
lutea, 56
Azucena, 290
del Camp, 290
Silvestre, 290

Backeberg, C., 322, 327, 341, 342, 343, 344
Bactris, 153-163
acanthophylla, 164, 166
Baileyana, 155, 156
bifida, 231
chætospatha, 160
Cuesco, 160, 231
demararana, 162, 163, 164, 165
devia, 157, 158
duplex, 160, 161
exscapa, 159
humilis, 159
inermis, 177
interrupte-pinnata, 159
microcalyx, 159
militaris, 208, 229, 230

Mindellii, 159
minima, 149, 164, 170
paraensis, 152
paula, 173
Porschiana, 157
superior, 157
Swabeyi, 163
tarumanensis, 159
Wendlandiana, 231
Baehni, C., 62
Bailey, E. Z., 5, 71
L. H., 5, 10, 31, 40, 59, 71, 73, 93, 157, 211, 215, 239, 333, 344, 423, 541
Bailie, James G., 80
Baillon, H. E., 454, 483, 541
Baker, J. G., 22, 55, 246, 247, 248, 269, 280, 281, 349, 353, 355, 356, 358
Balaka, 485, 488
pauciflora, 535
Seemannii, 304, 536
Balansa, B., 21
Baldacci, A., 37
Balfour, Sir Isaac Baily, 57
Balls, E. K., 251
Balsaminaceæ, 50
Barbosa-Rodrigues, J., 135, 173, 337
Barnhart, John H., 31
Barrett, Mary F., 27
Barry, David, 217, 481
Bartlett, H. H., 201, 213, 215, 217
Bartling, Friedrich, 26
Bartram, W. B., 26
Bartschella, 323, 324
Basellaceæ, 28
Bauhin, Caspar, 40
Bay-Rum-Tree, 53
Beahm, Sherman E., 328, 331
Beard, John, 113, 170
Beauverd, G., 395
Beauverdia, 19
Beccari, Odoardo, 10, 94, 98, 100, 101, 104, 110, 116, 209, 211, 212, 213, 214, 217, 297, 299, 423, 433, 437, 438, 443, 444, 445, 453, 454, 459, 461, 483, 484, 485, 486, 508, 512, 514, 530, 532, 533, 540, 541
Beckwith, Edward, 312, 314
Beechey, F. W., 466
Begoniaceæ, 51
Begonia echinosepala, 51
Haageana, 51
Scharffii, 51
Behria, 269
tenuiflora, 275
Belladonna, Cape, 18
Bellair, G., 388
Benson, L., 316, 327
Bentham, G., 63, 349, 356, 358
Bentinckiopsis, 458
carolinensis, 462
ponapensis, 463
Savoryana, 465
Benzon, Alfred, 102
Berberidaceæ, 35
Berberis, 35
Hookeri, 36
" *latifolia*, 35, 36
Knightii, 35
manipurana, 35
xanthoxylon, 35
Wallichiana, 36
" latifolia, 36
Berger, A., 81, 318, 322, 327, 332, 337, 340, 341, 342, 344
Bergmans, J. B., 15, 22, 63, 68
Bessera, 263, 264, 265, 266, 268-277
breviflora, 277
elegans, 268, 270, 271
fistulosa, 270
Herbertii, 270
miniata, 270, 275
multiflora, 270, 275
tenuiflora, 271, 275
Betulaceæ, 26
Be-ya-dau, 238
Bieberstein, Marschall von, 30
Bihai rutila, 25
Billardiera fusiformis, 39
Bisnicholsonia, 239
Blakeley, W. F., 53
Blatter, E., 10
Bloomeria, 264, 265
aurea, 293
Blossfeld, Harry, 389
Bluebell, Creeper, 39
Blume, K. L., 296
Boissier, E., 37
Bojer, Wenzel, 50
Bolus, H., 56
Boorman, J. L., 532
Borg, J., 334, 341, 344
Bottle-Brush, 52
Boussingaultia, 28
baselloides, 28, 80
gracilis pseudo-baselloides, 28, 80
Bowles, E. A., 33
Box, Harold E., 113
Boynton, Katherine T., 481
Bracket-Plant, 11
Brahea, 210, 211, 219-222
bella, 219
Berlandieri, 219
calcarata, 217
calcarea, 209, 219
Conzattii, 219
dulcis, 209, 211, 212, 219
Moorei, 219, 221
Pimo, 209, 216
prominens, 219
psilocalyx, 213
salvadorensis, 209, 217
serrulata, 211, 212
Brasilicactus, 322
Brasilopuntia, 325
Brassiophœnix, 485, 488
Bravo, H. H., 319, 320, 327

Breadfruit, 27
Briquet, J. I., 39
Brodiæa, 18, 20, 264, 265, 267
  californica, 20
  capitata, 20
  coronaria, 20
  Douglasii, 20
  hyacinthina, 20
  Ida-maia, 20
  ixioides, 20
  laxa, 20
  Purpusii, 266
  uniflora, 19, 20
Britten, J., 39, 55
Britton, N. L., 95, 117, 319, 320, 321, 322, 324, 325, 327, 329, 332, 333, 341, 343, 344
Brunsvigia rosea, 18
Bryan, E. H., 477
Bryocles ventricosa, 12
Buchanan, Francis, 28
Buc'hoz, Pierre, 43
Buckley, W., 333, 334
Buckwheat, 28
Bugeranbegerap, 449
Bu, 450
Bua, 450
Bulley, W. W., 414
Burbanck, Madeline, 18
Burret, M., 117, 130, 147, 149, 173, 189, 211, 297, 299, 307, 309, 310, 423, 444, 451, 453, 459, 461, 470, 483, 486, 515, 521, 524, 531, 533, 535, 540, 541, 542, 555, 564, 570, 574, 575
Burtt, B. L., 56, 68, 393
Buxbaum, F., 316, 323, 327, 333, 343, 344

Cabbage Palm, 437
Cactaceæ, 316, 328
Cactus, Christmas, 328
  latispinus, 320
Cagi Caki, 535
Calamus, 427, 431, 477
Calendula hybrida, 72
  pluvialis, 72
Callicore rosea, 18
Callistemon citrinus, 52
  " splendens, 52
  lanceolatus, 52
  scaber, 52
Calocarpum, 61
  mammosum, 61
  Sapota, 61
Calospermum mammosum, 61
Camassia scilloides, 249
Cameron, A. K., 53
Campanula Elatines fenestrellata, 82
  fenestrellata, 82
  garganica fenestrellata, 82
Candollea, 5
Canistel, 61
Capelle, G., 340, 345
Caprifoliaceæ, 70
Caragana, 43
  Chamlagu, 43
  sinica, 43
Carpoxylon, 531
Carriere, E., 341, 345, 393
Carya, 25
  cordiformis, 26
  illinoensis, 25
  Pecan, 25
Caryophyllaceæ, 29
Caryophyllus aromaticus, 53
  racemosus, 53
Caryota, 427, 430
  mitis, 477
  urens, 477
Castalis Tragus, 73
Castellanos, A., 343, 345
Castle, L., 341, 345
Catjang, 44
Cavanilles, A. J., 279, 281
Cebollin, 287
Centaurium umbellatum, 85
Cephalocereus, 318
Cephalophorus, 318
Cephalotaxaceæ, 7
Cephalotaxus, 8
  drupacea, 7, 8
  " *pedunculata*, 8
  Harringtonia, 8
  " drupacea, 8
  pedunculata, 8
Ceratostigma, 410-420
  abyssinicum, 411, 419
  asperrimum, 411, 413
  Griffithii, 410, 411, 417, 418
  minus, 410, 411, 414, 417, 418
  plumbaginoides, 410, 411
  Polhillii, 414
  speciosum, 411, 420
  Stapfiana, 413
  ulicinum, 411, 413
  Willmottianum, 410, 411, 416
Cerbera peruviana, 62
  Thevetia, 62
Cereus coccineus, 324
  megalanthus, 325
  Russellianus, 330
  setaceus, 324
Cestrum, 82
  elegans Smithii, 82
  purpureum Smithii, 82
Chamæcyparis obtusa Sanderi, 77
Chamædorea elegans, 233
  erumpens, 232, 234, 235
  " 'Fairchild', 233, 235
  fenestrata, 555
  ferruginea, 236, 237
  Karwinskyana, 236
  lepidota, 238
  microspadix, 233
  Pringlei, 233
  Schippii, 233

Seifrizii, 236
Tuerckheimii, 575
Chamærops fenestrata, 555
Chalcas Camuneng, 49
exotica, 49
paniculata, 49
Champedak, 27
Chardon, C. E., 186
Chevalier, A., 10
Chilita, 323, 324
Ching, R. C., 5, 6
Chittenden, F. J., 419
Chlorophytum capense, 11
elatum, 11
Christensen, Carl, 5, 6
Christophersen, E., 461
Chrysalidocarpus, 428, 431
lutescens, 477
Chrysopsis, 404-409
Cruiseana, 406, 407
floridana, 406
gossypina, 406
hyssopifolia, 406
mariana, 406
mixta, 404, 405
pinifolia, 406
scabrella, 409
trichophylla, 406
Cigar-Flower, 52
Cinnamomum japonicum, 36
pedunculatum, 36
Citrus, 49
deliciosa, 49
nobilis, 49
reticulata, 49
Clarke, C. B., 69, 395
Clausen, R. T., 39
Clematis dioscoreifolia, 33
" robusta, 32
Flammula robusta, 32
indivisa, 33
paniculata, 32
recta paniculata, 32
Clifford, George, 46
Clinosperma, 244
bractealis, 244, 245
Clinostigma, 428, 432, 458-466
carolinensis, 460, 462
exorrhiza, 460, 512, 530
onchorhyncha, 459
ponapensis, 460, 462, 463
samoense, 459, 460, 461
savaiiense, 459
Savoryana, 460, 462, 465
Smithii, 462
Clinostigmopsis, 458
Clove-Tree, 54
Coccothrinax, 94, 99
alta, 96, 101, 114, 117
anomala, 95, 96
argentata, 96
argentea, 96, 99, 101, 102, 103
australis, 94, 101, 114, 116
barbadensis, 109
Boxii, 101, 113, 115, 116
discreta, 101, 104, 106, 107, 108
Dussiana, 101, 104, 109, 111, 112
Eggersiana, 101, 102
" sanctæ-crucis, 101, 102
Ekmanii, 96
fragrans, 96
martinicaensis, 101, 103, 104, 105, 106
sabana, 101, 110, 112, 113
sancti-thomae, 101, 107, 109, 110
Cochlearia Armoracia, 85
Coconut, 472
Cocos, 429, 431, 471
nucifera, 471, 473
Cælococcus, 438
amicarum, 439
carolinensis, 439
Coleospadix, 298
Beguinii, 299, 304
gracilis, 299, 300
litigiosus, 299
oninensis, 299
porrectus, 299, 307
Collinsia, 66
bicolor, 66
heterophylla, 66
Columnea Banksii, 376
glabra, 376
kewensis, 376
Lemoinei, 376
Schiedeana, 376
vedrariensis, 376
Vilmoriniana, 376
Compositæ, 70
Conard, H. S., 31
Coneflower, 73
Conothelæ, 324
Consolea, 325
Constance, L., 55
Convallaria Polygonatum, 85
pubescens, 12
Cook, O. F., 60, 116, 119, 211, 212, 218, 236
Copeland, E. B., 5, 6
Copernicia, 211
Burretiana, 211
cerifera, 211, 212
glaucescens, 214
hospita, 211
macroglossa, 211
tectorum, 211
Torreana, 211
Wrightii, 211, 212
Coquito, 565
Corbitt, R. G., 214
Cornman, J., 78
Corner, E. J. H., 27
Coronopus procumbens, 85
Corydalis, 80
albiflora, 80
cava albiflora, 80
Corylaceæ, 26

Corynopuntia, 325
Corypha japonica, 435
Coryphantha, 318
  Roseana, 318
  strobiliformis, 318
Corytholoma, 389
  cardinalis, 389
Cotyledon oregonensis, 39
Coyolito, 565
Coyure, 164
Cracca atropurpurea, 43
Crane, F. V., 496
Crantz, H. J., 63
Crassulaceæ, 39
Cress, Rock-, 37
Crinum bulbispermum, 16
  capense, 16
  longifolium, 16
Crocus Kotschyanus, 20
  zonatus, 20
Croizat, L., 50, 319, 320, 322, 327
Cronquist, A., 62
Crown-of-Thorns, 50
Cruciferæ, 37
Cruise, James E., 409
Cufodontis, G., 567
Cuphea ignea, 52
  platycentra, 52
Cupressaceæ, 9
Cupressus Duclouxiana, 9
  pisifera Sanderi, 77
  torulosa, 9
Curima calophylla, 164, 166
  corallina, 170
Curran, Hugo, 296, 314
Cybistetes longifolia, 17
Cyclophorus, 5
  Lingua, 5
  " *corymbiferum*, 77
Cylindropuntia, 325, 326
Cyphokentia boninensis, 465
  bractealis, 244
  carolinensis, 462
  Savoryana, 465
Cypress, 9
Cyrtostachys, 427, 431
  lakka, 477

Dahlgren, B. E., 101, 177, 242, 574
Dammer, U., 239, 241, 575
Dandy, James E., 263, 267, 530
Dandya, 264, 266
  Purpusii, 266
Danser, B. H., 297
Datura Stramonium, 85
Davis, F. D., 122
Dayton, W. A., 60, 253
Decaisne, Joseph, 67, 357, 397
DeCandolle, A. P., 72, 320, 326, 327, 380
Degener, O., 513, 524
Dehnhardt, F., 52
Delavay, Abbe, 57
Desfontaine, Rene, 44, 50
Desmet, M. L., 335
Desmoncus, 177-189
  apureanus, 183, 185
  demeraranus, 181, 182
  horridus, 177, 178, 179, 180
  mirandanus, 183, 184
  vacivus, 186, 188
  Velezii, 186, 187
DeYoung, Mrs. Ruth, 376
Dianthus hyssopifolius, 30
  monspeliacus, 30
  monspessulanus, 30
  plumarius, 30
Diaphne stylosa, 364
Diastema Lehmannii, 377
  pictum, 377
  vexans, 377
Dichelostemma, 20, 264, 265
  Ida-maia, 20
  pulchellum, 20, 293
Dictyosperma, 428, 432
  album, 477
Didymosperma, 428, 430
  porphyrocarpum, 477
Diels, F., 346, 353, 358, 359, 361
Digitalis, 66
  ambigua, 66, 67
  grandiflora, 67
  ochroleuca, 67
Dimorphotheca, 72
  annua, 71, 72
  aurantiaca, 71, 72, 73
  calendulacea, 73
  Ecklonis, 71, 73
  hybrida, 72
  pluvialis, 72
  pseudo-aurantiaca, 73
  sinuata, 73
Diphalangium, 264, 280
  graminifolium, 280
Dircæa, 389
  cardinalis, 389
Discocactus, 322
Dodecatheon, 58
  integrifolium, 58
  Meadia pauciflorum, 58
  pauciflorum, 59
  pulchellum, 58
  vulgare, 59
Dodoens, R., 40
Dolichos Catjang, 44
  Soja, 46, 47, 48, 49
Domaile, 449
Domaire, 449
Donkelaar, 398
Donn, James, 22
Doyle, C. B., 218
Dress, William J., 404
Druce, G. C., 38, 70
Drude, C., 10, 173, 189, 454, 483, 531, 541
Drymophlœus, 296-309
  angustifolius, 299
  Beguinii, 300, 304, 305, 306

ceramensis, 297
filiferus, 533
jaculatoria, 200
olivæformis, 296, 300, 301, 302
porrectus, 307, 308
samoensis, 536
Whitmeeanus, 536
Dugand, A., 574
Duke of Bedford, 8
Dunaway, Harry, 233
Durazzini, 44
Duss, Pere, 104, 110, 173
Duthie, J. F., 58
Dykes, W. R., 21, 22, 346, 349, 355, 356, 357, 358, 359, 361

Ebnerella, 323
Echeandia eleutherandra, 246
Echinocactus, 319
cornigerus, 320
platyacanthus, 319, 320
Roseanus, 318
strobiliformis, 318
Echinops exaltatus, 71
Ritro, 71
sphærocephalus, 71
Echites laxa, 62
Egg-Fruit Tree, 61
Ehrenberg, G. G., 246
Ehrlich, 39
Elæis, 431
guineensis, 149, 429, 477
Elwes, H. J., 15
Endlicher, S. L., 280
Engelmann, G., 325, 326, 327
Epiphyllanthus, 337
obovatus, 338
obtusangulus, 338
opuntioides, 337, 338
Epiphyllopsis, 329
Gaertneri, 340
" *Makoyana*, 340
" *Tiburtii*, 342
opuntioides, 332
Epiphyllum, 320, 328
Altensteinii, 330
Bridgesii, 331, 332, 333, 335, 336
Buckleyi, 333
coccineum, 339
cupreum, 333
delicatum, 330
Gaertneri, 339
" *coccineum*, 339
" *Makoyanum*, 339
macropterum, 321
Makoyanum, 339
obovatum, 332, 338
opuntioides, 332, 338
Phyllanthus, 320, 329
polycanthum, 338
Rollissonii, 333
Ruckeri, 331
Ruckerianum, 331, 333, 334
Rueckeri, 331, 333
Rueckerianum, 331
Russellianum, 330
" *Gaertneri*, 339
Thomasianum, 321
truncatum, 329
" *Altensteinii*, 330
" *Bridgesii*, 331
" *Ruckerianum*, 334
" *Russellianum*, 330
Episcia cupreata, 378
dianthiflora, 374, 378, 379
fulgida, 378
lilacina, 378
punctata, 378
Eremogyne graminifolia, 29
procera, 29
Erica canaliculata, 56
corsica, 56
melanthera, 56
multicaulis, 56
ramulosa, 56
stricta, 56
terminalis, 56
Ericaceæ, 55
Eriocactus, 322
Ervum Lens, 45
Eryngium, 55
aquaticum, 55
yuccifolium, 55
Erythea, 209, 210, 212, 215-219
aculeata, 216
armata, 216
Brandegeei, 216
clara, 216
edulis, 216
elegans, 216
Pimo, 216
salvadorensis, 217
Escobaria, 318
Estrella, 290
Eucalyptus camaldulensis, 52
longirostris, 52
rostrata, 52
Eucodonia Ehrenbergii, 375, 395
Eucodonopsis, 395-397
achimenoides, 396
nægelioides, 396
picturata, 397
Roezlii, 397
Euescobaria, 318
Eugenia aromatica, 53
caryophyllata, 53
cauliflora, 54
elliptica, 54
Jambos, 54
Smithii, 54
Euonymus alatus compactus, 81
" *nanus*, 81
Euphorbia Milii, 49
splendens, 49

Euphorbiaceæ, 49
Eupritchardia, 10
Euryale amazonica, 30
Euterpe, 486
  brachyspatha, 575
  caribæa, 120
  globosa, 444
  Jenmanii, 117, 130, 131, 134
  longepetiolata, 575
  pisifera, 444, 445
  simiarum, 575
  ventricosa, 130, 133, 134
Evansia dichotoma, 357
Exinia pulchella, 58
Exorrhiza, 458
  carolinensis, 462
  ponapensis, 463
  Savoryana, 465
  Smithii, 462
  Wendlandiana, 530
Eyma, 61

Faassen, Johannes Hubertus, 64
Faasha, 476
Fagaceæ, 26
Fagopyrum esculentum, 28, 85, 90
  Fagopyrum, 85
  sagittatum, 28, 85, 90
Fairchild, David, 233, 295, 309, 313, 314
Fairchild Tropical Garden, 481, 482
Fantastic Gardens, 378, 398
Fernald, M. L., 9, 13, 14, 26, 40, 74
Ferocactus, 319, 320
Ficaria verna, 85
Ficus, 27
  infectoria, 27
  Lacor, 27
Filipendula hexapetala, 85
Fiori, A., 44, 56
Fir, Noble, 9
  Silver, 9
Fischer, Friedrich, 37
Fletcher, H. R., 57, 58
Flor de San Juan, 290
  de San Nicolas, 290
Floto, Ernst V., 63
Forrest, George, 57, 58
Forskal, Pehr, 30
Fortune, R., 412
Fosberg, F. R., 27, 53, 421
Foster, M. B., 223, 225
  R., 225
  R. C., 350, 359, 361
  Robert, 21
  Sir Michael, 349, 355
Foxglove, Yellow, 66
Frailea, 322
Franceschi, F., 209, 217
Franchet, A., 57
Friedrichsthal, 571
Fritsch, K., 375, 377, 384, 385, 399
Fruitland Nurseries, 80

Funkia glauca, 11
  Sieboldiana, 11
  " *condensata*, 11
Furtado, C. X., 495, 496

Gaertner, Joseph, 60, 70, 86, 115, 164, 444, 445, 446
Galactochylus, 323
Gardner, George, 330
Gay, Jacques, 21
Gentry, H. S., 281
Geonoma fenestrata, 555
Geranium, 250-257
  alpicola, 251
  aristatum, 251
  aristisepalum, 251
  " *michoacanum*, 251
  azorelloides, 257
  bellum, 252
  costaricense, 253
  crenatifolium, 252
  cucullatum, 253
  " *multifidum*, 253
  deltoideum, 251
  Hernandesii, 251
  " Hernandesii, 251
  " michoacum, 251
  Jackelæ, 255
  Jahnii, 257
  maniculatum, 254
  multifidum, 253
  oaxacanum, 252
  potosinum, 252
  rhomboidale, 255, 256
  Schiedeanum, 252
  sibbaldioides, 253, 255, 257
  unguiculatum, 252
Gesnera, 388
  exoniensis, 393
  Lindleyana, 393
  nægelioides, 396
  refulgens, 393
Gesneria cardinalis, 389
  Donkelaariana, 397
  Donkelarii, 397
  egregia, 399
  Lindenii, 380
  macrantha, 389
  maculata, 379
  robusta, 393
Gesneriaceæ, 67, 375
Gheerbrant, 399
Gilibert, J. E., 28, 83
Gilly, C. L., 59
Glassman, S. F., 424, 439, 465, 470, 477
Gleason, H. A., 177
Glen St. Mary Nurseries, 80
Gloxinera, 397
  'Brilliant', 397
  Donkelaariana, 397
  gesnerioides, 398
  rosea, 398

Gloxinia, 389
cerina, 391
gesnerioides, 398
Lindeniana, 380
Tapeinotes, 392
Glubiopsis palauensis, 451
Glycine, 45-49
hispida, 48, 49
Max, 46, 49
Soja, 46, 48, 49
ussuriensis, 49
Gmelin, S. G., 33
Gomezia, 70
Gomozia granadensis, 69
Gorgas, William Crawford, 117
Gorgasia, 117
maxima, 120
oleracea, 120
Gori Poetoc, 314
Gormania Watsonii, 39
Gottholdt, 388
Graebner, K., 30
Graeffe, 540
Grape-Tree, Brazilian, 54
Green, M. L., 351, 483, 484
Greene, E. L., 19, 59, 269, 320, 327, 409
Gressitt, J. L., 423, 424
Griffith, William, 419
Griggs, R. F., 24
Grisebach, A. H. R., 122
Gris-gris, 153
Gronophyllum, 310
Grus-grus, 135
Gudjonsson, 64
Guggenheim, John Simon, 482
Guillaumin, A., 531
Gulubia, 428, 432, 453-457
Brassii, 454
costata, 454
moluccana, 454
palauensis, 424, 453, 454, 455, 456
Gulubiopsis, 310, 453
palauensis, 455
Gum, Murray Red, 52
Gunther, August, 47
Guthrie, F., 56
Gyrenia, 279
biflora, 279

Haagea, 324
Schwarzii, 324
Haage & Schmit, 51
Haenke, T., 31
Hagen, von, 571
Haitiella Ekmanii, 96
Hale, C. B., 217
Haloragaceæ, 55
Hamilton, Lord, 28
Hampfler, G., 566
Handel-Mazzetti, H., 27
Hannibal, L. S., 18
Hansen, Mölholm, 481, 541
Hanstein, J., 375, 380, 386
Hariota, 342
Harvey, William, 72
Hasselbring, H., 22
Hatiora, 342
clavata, 343
Hattori, 437, 466
Haught, O., 575
Hauman, 29
Hay, T., 65
Hayek, A., 37, 44
Heartnut, 26
Hedyotis pedunculata, 36
Hedyscepe Canterburyana, 484, 535
Heer, 386, 387
Hegi, G., 44, 85
Heliconia Bihai, 24, 25
caribæa, 24
rutila, 24, 25
variegata, 25
Hemerocallis cærulea, 12
Sieboldtiana, 11
Henry, A., 8
Hepatica triloba, 85
Heppiantha, 399
nægelioides, 399
Heppiella nægelioides, 399
Herbert, William, 17, 274
Hermann, Paul, 47
Hernandez Xolocotzi, E., 201, 209, 562
Herter, W. G., 18
Heterospathe, 429, 431, 444-449
elata, 444, 445, 446
" elata, 447
" *guamensis*, 447
" palauensis, 448
palauensis, 447, 448
pisifera, 444
Hexopetion, 149
Hibun, 443
Hickenia, 322
Hicoria Pecan, 25
Hill, A. F., 11, 27, 28, 45, 46, 52, 53
W., 527
Hippeastrum, 17
equestre, 17
puniceum, 17
Hochstetter, C. F., 410
Hodge, W. H., 24
Hoffman, 57
Holcus Sorghum caudatus, 79
Holm, R. W., 239
Hooker, J. D., 45, 50, 51, 483, 541, 542
W. J., 12, 29, 201, 211, 330, 345, 397
Hoover, Robert F., 18, 264, 267, 279
Horridocactus, 322
Hosino, 477
Hosokawa, 443
Hosseus, 413
Hosta, 11, 12
cærulea, 12
glauca, 11
Sieboldiana, 12
ventricosa, 12

Howeia, 429, 431
Forsteriana, 477
Hughes, Griffith, 122
Hume, H. H., 16
Hutchinson, J. F., 260, 263, 267
John, 15
Hutson, L. R., 113, 114
Hylander, Nils, 23, 63, 67, 83
Hydriastele, 486
Hylocereus, 324
Hyophorbe amaricaulis, 478
Hyospathe concinna, 195, 196
elegans, 199
filiformis, 197
gracilis, 199
Lehmannii, 199
pallida, 197, 198
Schultzeæ, 195
simplex, 195

Ilex crenata Helleri, 81
Helleri, 81
Iltis, H. H., 239
Impatiens glandulifera, 50
" pallidiflora, 51
Roylei, 50
taprobanica, 50
Ingram, John, 263, 264, 267
Ipheion, 265, 279
hirtellum, 294
Sellowianum, 294
Tweedianum, 294
uniflorum, 19, 20, 293, 294
vittatum, 294
Iridaceæ, 20
Iris, 21, 346-371
(see special index, page 366)
aurea, 21
crocea, 21
ensata, 22
extremorientalis, 23, 24
graminea, 22
hæmatophylla, 24
halophila, 21
hertschinskiana, 24
japonica, 22
ochroleuca, 21, 22, 23
orientalis, 21, 22, 23, 24
Pseudacorus, 21
sanguinea, 22, 23, 24
sibirica, 22, 23, 24
" *orientalis*, 24
" *sanguinea*, 24
squalens, 22
Thunbergii, 23, 24
versicolor, 22
Islaya, 322
Isoloma amabile, 67
bogotense, 67
giganteum, 384
hirsutum, 68
hondense, 68
Lindenianum, 380

Ivory, Vegetable, 425
Ixiolirion, 16
Ledebourii, 16
montanum, 16
Pallasii, 16
tataricum, 16

Jaboticaba, 54
Jacinto de Monte, 290
Jackson, B. D., 364
Jacquin, Nicolaus J., 60, 114, 122
Jakfruit, 27
Jambos, 54
Jambosa Jambos, 54
vulgaris, 54
Jankæa, 395
Jasmine, Chilean, 62
Jasminum multiflorum, 62
pubescens, 62
Jaubert, H. F., 71
Jennings, Mrs. Alvin R., 481
Jenman, George S., 131
Jessamine, Orange-, 49
Johnson, H., 345
Johnston, Ivan, 278, 281, 287
Juglandaceæ, 25
Juglans ailantifolia, 25
" cordiformis, 25
cordiformis, 25, 26
" *ailantifolia*, 26
illinoinensis, 25
pecan, 25
Sieboldiana, 25
" *cordiformis*, 25
Jujube, 51
Juneberry, 40
Juniper, Alligator, 10
Mexican, 10
Juniperus chinensis arbuscula, 78
" densa, 78
" Keteleeri, 78
" *Smithii*, 78
Deppeana, 10
media, 78
" *arbuscula*, 78
mexicana, 10
monticola compacta, 10
sabinoides, 10
Sanderi, 77
sinensis Keteleeri, 78
sphærica Keteleeri, 78
virginiana Hillii, 78
" *Keteleeri*, 78
" *pyramidiformis*, 78, 79
" " *Hillii*, 78
" *Smithii pendula*, 78
" " *penduliformis*, 78

Kaempfer, E., 466
Kajewskia, 486, 487, 490, 495
aneityensis, 530
Kanehira, 423, 453, 468, 470
Karwinsky, 274

Kattai, 470
Kegel, 554
Kentia, 310
  exorrhiza, 512
  Fipan, 509
  Joannis, 509
  procera, 454
  subglobosa, 532
Kiem, Stanley, 481
Kimnach, M., 342, 345
Kinetostigma Tuerckheimii, 189
Kittlitz, 466
Klatt, F. W., 21
Knebel, C., 338, 340, 345
Knight, Joseph, 8
  & Perry, 412
Knuth, 322, 326, 341, 342
Kobuski, C., 62
Koch, Carl, 20, 25, 246, 247
Koernickea lanata, 376
Kohleria, 379-388
  amabilis, 67, 382, 388
  Behnickii, 385
  bogotensis, 67, 382
  dubia, 384
  'Eeckhautii', 387
  elongata, 386
  eriantha, 385
  ferruginea, 384
  gigantea, 384
  Hansteinii, 385
  Heeriana, 386
  Hillii, 386
  hirsuta, 68
  hondensis, 68
  lanata, 379
  Lenneana, 386
  Lindeniana, 380, 381
  Lindenii, 382
  longipedunculata, 379
  Lucianii, 386
  maculata, 379, 380
  magnifica, 383
  'Marquis de Guadiano', 388
  'Meyerbeer', 388
  ocellata, 383, 386
  Ortgiesii, 383, 387
  pulchra, 387
    " 'Argyroneura', 384
  Regelii, 386
  Rossiana, 387
  Straussiana, 387
  Trianæ, 388
  'Vaca de Castro', 388
  'Vesuvius', 387
  Warszewiczii, 384
Koidzumi, Gen'ichi, 8, 23
Kotop, 465
Kotschy, Theodor, 20
Krause, 270, 280
Kuntze, Otto, 10, 11
Kuter, 470
Kyywa, 476
Labiatæ, 63
Lacaita, C., 37
Lacanal, 336, 345
Lam, H. J., 62
Lambs-Ears, 63
Langlois, A. C., 295, 304, 309, 314, 481, 553
  M. A., 555
Lanjouw, J., 318, 320, 327, 433
Lappula echinata, 85
Larix decidua, 85
Larpent, Sir George, 412
Latace, 265
Latania, 427, 430
  borbonica, 477
  chinensis, 433
  Commersonii, 477
  Loddigesii, 477
Lauraceæ, 36
Laurus pedunculata, 36
Lawrence, G. H. M., 1, 77, 346, 410, 502
  W. J. C., 393
Leadwort, 412
Lebbeck, 44
Ledebour, C. F., 357
Leguminosæ, 43
Lemaire, C., 275, 321, 332, 334, 336, 337, 345, 380, 395
Lemee, 483
Lens culinaris, 45
  esculenta, 45
Lentil, 45
Leon, Hermano, 96, 117
Lepachys columnaris, 73
  columnifera, 73
Lepidocaryphantha, 318
Lescuyer, 388
Lessing, Christian Friedrich, 72
Leucocoryne, 265
Liebmann, F. M., 149, 189, 541, 542, 550, 552
Liliaceae, 11, 15
Lilia Cimaron, 290
Lilium, 14
  dauricum Thunbergianum atrosanguineum, 79
  Davidii Willmottiæ, 15
  elegans, 14
    " *atrosanguineum*, 79
  hollandicum, 15
  Humboldtii, 15
    " *magnificum*, 15
    " ocellatum, 15
  imperiale, 14
  maculatum, 15
    " atrosanguineum, 79
  princeps, 14
  Thunbergianum, 15
    " *atrosanguineum*, 79
  umbellatum, 15
  Willmottiæ, 15
Lily, Siberian-, 16
  Tartar-, 16

Linden, 383
Lindley, J., 31, 32, 275, 392, 412
Link, H. F., 319, 327
Linnæus, 11, 17, 21, 40, 44, 46, 47, 55, 59, 68, 71, 72, 73, 84
Little, E. L., 9, 10, 26, 44, 59
Livistonia, 426, 430, 432-438
altissima, 477
boninensis, 435
chinensis, 433
" boninensis, 434, 435
" chinensis, 434
" subglobosa, 433, 434, 435, 477
rotundifolia, 477
Locheria magnifica, 383
Loddiges, C., 12, 56, 98
Löfgren, A., 337, 338, 345
Lonas annua, 70
inodora, 70
Longwood Gardens, 481
Lucuma mammosa, 61
nervosa, 61, 62
Ludlow, F., 413
Ludwigia, 54
Mulertii, 54
natans, 54
" stipitata, 54
Lundström, 22
Lycopodium cuspidatum, 7
pallescens, 7
Lythraceæ, 52

Macbride, J. F., 73, 269, 559, 569
MacDaniels, L. H., 244, 497, 498
MacDougall, T., 564
Madeira-Vine, 29
Malacocarpus, 322
Malortie, Ernst von, 189, 542
Malortiea, 541, 545, 547
gracilis, 189, 555
intermedia, 189, 575
Koschnyana, 189, 572
lacerata, 189, 575
latisecta, 189, 552
pumila, 572, 574
rostrata, 189, 565
simiarum, 575
simplex, 189, 568
speciosa, 189, 575
Tuerckheimii, 189, 575
Malus, 40
persica maxima, 60
sylvestris, 85
Mammillaria, 323, 324
coahuilensis, 324
strobiliformis, 318
Mammilloydia, 323, 324
Mandevilla laxa, 62
suaveolens, 62
Mandirola lanata, 375, 395
Manilkara zapotilla, 61
Mansfeld, R., 28, 30, 39, 67
Mansini, Francisco Antonio, 137
Marigold, Cape-, 71
Marshall, Humphrey, 25
Martinez, M., 10
Martinezia acanthophylla, 166
corallina, 164, 170
distichа, 225
erosa, 164, 166
Martius, 98, 100, 135, 139, 152, 177, 197, 296, 433, 541, 542, 552
Mascarena, 428, 431
lagenicaulis, 478
Verschaffeltii, 478
Mathias, M., 55
Maw, George, 21
Maximowicz, C. J., 48
Maxon, W. R., 7
Maysilles, James H., 252
McDowell, 319
McVaugh, Rogers, 28, 83
Medicus, 45
Mediocactus, 324
Megapleilis, 388
Meiota campechana, 236
Menyanthes Nymphoides, 85
Merrill, E. D., 27, 35, 38, 44, 46, 53, 59, 304, 477
Mespilus arborea, 40
canadensis, 40
" *cordata*, 40
Metrosideros citrina, 52
lanceolata, 52
lophantha, 52
semperflorens, 52
Metroxylon, 428, 431, 438-444
amicarum, 422, 424, 425, 428, 439, 440 442, 478
" *commune*, 439, 443
" *majus*, 439, 443
carolinense, 439
Rumphii, 478
Sagu, 478
vitiense, 425
Meyer, G. F. W., 147, 149
M'Gillivray, 531
Michaux, André, 26, 40
François, 9, 40
Mico, Francisco, 68
Miers, John, 65
Mignonette-Vine, 29
Milla, 263, 264, 265, 266, 278-294
andicola, 293
aurea, 293
biflora, 263, 265, 268, 278, 279, 280, 281, 287
bivalvis, 293
bonariensis, 293
borbonica, 293
brevipes, 293
Bryanii, 278, 279, 281, 285, 286
cærulea, 294
capitata, 293
crocea, 294
delicata, 278, 279, 281, 291, 292

grandiflora, 294
hirtella, 294
hyacinthina, 294
ixioides, 294
laxa, 294
Leichtlinii, 294
macrostemon, 294
magnifica, 278, 279, 280, 281, 282, 283
maritima, 294
Mortoniana, 278, 279, 281, 291, 292
nivalis, 294
patagonica, 294
pedunculatis, 294
Poeppigiana, 294
porrifolia, 294
rosea, 278, 279, 281, 284, 285
Sellowiana, 294
sessiliflora, 294
setacea, 294
subbiflora, 294
Tweediana, 294
uniflora, 19, 294
violacea, 294
vittata, 294
Millan, Roberto, 65
Millea, 278
biflora, 287
Miller, Philip, 9, 11, 21, 40, 51, 66, 86, 363
Milne-Redhead, 17
Mimosa Lebbek, 45
Miquel, F. A. W., 12, 297
Mirbel, Charles Francois, 26, 86
Mocino, J. M., 250, 380
Moench, K., 45, 85
Montgomery, Robert H., 496, 524
Moore, Harold Emery Jr., 93, 155, 191, 207, 220, 263, 295, 375, 421, 479
J. W., 53
T., 333, 334, 345
Moraceæ, 27
Moran, Reid, 277, 316, 328
Morenia latisecta, 203, 204
Morse, W. J., 46
Morton, C. V., 10, 67, 293, 380
Moscoso, 96
Motiti, 530
Moulins, Charles des, 50
Mountjoy & Sons, 392
Muilla, 264, 265, 267
maritima, 294
Purpusii, 266
Mulligan, Brian O., 415
Mung, 46
Munz, P. A., 5, 32, 54, 55, 66, 71
Murræa exotica, 49
Murraya, 49
exotica, 49
paniculata, 49
Musa Bihai, 24, 25
Musaceæ, 24
Myosotis Lappula, 85
Myrcia acris, 53
Myrciaria cauliflora, 54
Myriophyllum brasiliense, 55
prosperinacoides, 55
Myrtaceæ, 52
Myrtus acris, 53
caryophyllata, 53
Caryophyllus, 53
Jambos, 54
Smithii, 54

Nægelia achimenoides, 396
hyacinthina, 393
hybrida, 393
zebrino-multiflora, 393
Nagy, 392
Nakai, T., 36, 433, 438
Nakayama, Mitsu, 263, 295, 375, 482
Nakoi, 431
National Academy of Sciences, 482
Necker, N. J., 320, 321, 327
Nees, 36
Nengella, 486
Neochilenia, 322
Neomammillaria, 323
Neonicholsonia, 239
Georgei, 242
Watsonii, 240, 241, 242
Neoveitchia, 483, 484, 485, 537-540
Storckii, 535, 538-540
Nepenthaceæ, 38
Nepenthes mirabilis, 38
Phyllamphora, 38
Nepeta Faassenii, 63, 64
Mussinii, 63, 64
nepetella, 63
pseudomussinii, 63
Nertera, 69
depressa, 69
granadensis, 69
Nicholson, G., 393
Nierembergia, 65
cærulea, 65, 66
hippomanica, 65
" cærulea, 66
" violacea, 66
Niobe Sieboldiana, 12
Nioshi, 443
Nipa, 476
Niphobolus, 5
Nopalea, 325
Norlindh, Tycho, 72
Normanbya, 485, 486, 487
Merrillii, 501
Nothoscordum, 19, 265
andicola, 293
aureum, 293
inodorum, 293, 294
Notocactus, 322
Nuiniu, 508, 526
Nuisawa, 508, 513

Nyctanthes multiflora, 62
pubescens, 62
Nymphæacacæ, 30
Nymphoides peltatum, 85
Nypa, 427, 431, 475
fruticans, 475

Oak, Darlington, 27
Laurel, 26
Odontites rubra, 85
Odontosoria chinensis, 5
Oehmea, 323
Œnothera erythrosepala, 55
Lamarckiana, 55
Oguri, Mario, 378
Oleaceæ, 62
Oleander, Yellow, 63
Onagraceæ, 54
Onagra erythrosepala, 55
Opuntia, 325
arborescens, 326
cylindrica, 326
imbricata, 326
rosea, 326
tunicata, 317
Orange, Mandarin, 49
Ordonez, 524
Oreodoxa, 115, 117
caribæa, 120
oleracea, 120
princeps, 117, 123
Ortgies, 386, 388
Os, 443
Osteospermum Ecklonis, 73
Othonna capensis, 71
crassifolia, 71
Othonnopsis cheirifolia, 71
Otto, F., 319, 327
Overlook Nurseries, 78
Ownbey, 13
Oxycoccus quadripetala, 85
tetrapetala, 85

Padus avium, 85
Pæonia, 33
albiflorum, 33
" *fragrans*, 33
edulis, 33
" *Reevesiana*, 33
" *sinensis*, 33
lactiflora, 33
Reevesiana, 33
Pallas, Peter Simon, 33
Palm, Betel-Nut, 450
Blue, 126
Broom, 94
Cabbage, 437
Caribbee Royal, 120
Florida Royal, 128
Hispaniolan Royal, 127
Ivory Nut, 439
Jamaica Royal, 126
Morass Royal, 123
Peaberry, 99
Puerto Rican Royal, 126
Round-fruited Royal, 127
Royal, 114
Seamberry, 99
Silk, 123
Star-Nut, 147
White, 123
Palma argentata, 95, 96
elata, 128
maxima, 122
Palmaceæ, 10
Pam, Major Albert, 18
Paramaca, 152
Pardanthus dichotomus, 357
Parham, B. E., 482, 518
John W., 482, 518, 540
Mrs. H. B. R., 518
Parkinson, Sidney, 27
Parodia, 322
Parrots-Feather, 55
Pasteur, James, 422, 438, 440, 450
Paurotis, 210-215
androsana, 213
Schippii, 213, 215, 219
Wrightii, 211, 212
Pax, F., 57, 349
Paxton, J., 33, 35, 333, 337, 345, 392
Pear, 40
Pecan, 25
Pereskiopsis, 325
Perry, L. M., 53
Persicaria mitis, 85
Persoon, C. H., 68, 86
Pesem, 307
Petronymphe, 258, 264, 265, 266, 277
decora, 258, 259, 277
Petitimengin, 57
Pfeiffer, 324
Phalangium pusillum, 247
Pharium, 269
elegans, 270
fistulosum, 270
Herbertii, 270
Phaseolus, 46, 47
cylindricus, 44
Max, 46, 47, 48, 49
Mungo, 46, 47
" radiatus, 46
radiatus, 46
Phellosperma, 323, 324
Phlebodium aureum, 7
Phœnix, 10, 427, 430
canariensis, 478
dactylifera, 478
humilis Loureiri, 10
Loureiri, 10
pusilla, 10
Roebelinii, 10, 478
Photinia serrulata aculeata, 80
Phyllamphora mirabilis, 38
Phyllarthus, 320

Phyllocactus, 320, 329
crenatus, 321
Gaertneri, 339
" *Makoyanus*, 339
macropterus, 321
Russellianus, 330
Thomasianus, 321
Phymatodes Scolopendrium, 7
Picea nobilis glauca, 77
Pichi-Sermolli, 454, 461, 483, 484, 488, 489, 525
Pickering, 461, 534, 535, 540
Pickle-Plant, 71
Pierre, 60
Pimenta, 53
acris, 53
racemosa, 53
" grisea, 53
Pinaceæ, 9
Pinanga, 427, 432, 450–453
insignis, 451
micronesica, 451
Pine, Longleaf, 9
Pink, Cottage, 30
Pinus australis, 9
Larix, 85
nobilis, 9
palustris, 9
Taeda, 9
Piper, C. V., 46, 47, 48
Pirostele, 42
Pittier, H., 183, 194
Pittosporaceæ, 39
Planchon, J. E., 31, 384, 397
Plantain-Lily, Blue, 12
Short-cluster, 12
Platyopuntia, 325
Plectopoma nægelioides, 396
Plukenet, 138
Plumbago eglandulosa, 420
Larpentæ, 411
Plumier, 59
Plum-Yew, Japanese, 7, 8
Poe, 450
Poeppig, Eduard, 31
Polygonaceæ, 28
Polygonatum biflorum, 12
canaliculatum, 13
officinale, 85
pubescens, 12
Polygonum Fagopyrum, 85
Persicaria, 85
Polypodiaceæ, 5
Polypodium, 6
aureum, 7
Phymatodes, 7
vulgare, 6
Polystichum, 6
aculeatum, 6
angulare, 6
lobatum, 6
setiferum, 6
Ponapea, 466
Hosinoi, 468
kusaiensis, 469
Ledermanniana, 469
palauensis, 470
Porfiria, 323, 324
coahuilensis, 324
Porras, 209
Porsch, O., 325, 327
Porto, P. C., 343, 345
Potztal, 483, 541
Pouteria campechiana, 61
" nervosa, 62
Prain, Sir David, 46, 47, 413, 414
Pratt, A. E., 414
Primula, 56
cortusoides lichiangensis, 58
involucrata Wardii, 57
lichiangensis, 58
Littoniana, 57
polyneura, 58
" *lichiangensis*, 58
" *Veitchii*, 58
Veitchii, 58
Vialii, 57
Wardii, 57
Watsonii, 57
yargongensis, 57
Primulaceæ, 56
Pringle, 248
Pritchardia, 10, 430
pacifica, 426, 478
Pritchardioxylon, 10
Prunus Padus, 85
Pseudocoryphantha, 318
Pseudomammillaria, 324
Pseudopinanga, 450
insignis, 451
Pseudozygocactus, 343
Pteris multifida, 6
serrulata 6
Pterocactus, 325
Ptychococcus, 485, 486, 488
Ptychosperma, 427, 432, 466, 485, 486, 488
elegans, 466
filiferum, 515, 533
Hartmannii, 467, 468
Hosinoi, 467, 468
Ledermanniana, 467, 468, 469
Macarthuri, 427, 467, 478
palauensis, 467, 470
pauciflorum, 535
Pickeringii, 534
vitiense, 514, 515
Pu, 450
Pugua, 450
Purdy, Carl, 15
Pursh, Frederick, 15
Pycnodoria multifida, 6
Pynaert, L., 341, 345
Pyrenoglyphis, 173
Pyrrhocactus, 322

Pyrrosia, 5
Lingua, 5
" corymbiferum, 77
Pyrus, 40
Malus, 85

Quercus Darlingtonii, 27
hemisphærica, 26
laurifolia, 26
nigra, 27
obtusa, 26
rhombica, 26
Questel, Adrien, 128
Quiabentia, 325

Radermachia incisa, 27
Radlkofer, 60
Rafinesque, Constantino, 19, 21, 59, 73
Ramonda Heldreichii, 395
Myconii, 68, 395
pyrenaica, 68
Van-Dedemii, 395
Ramond de Carbonnieres, Baron L. E. E. von, 68
Rand, Edward S. Jr., 31
Randolph, L. F., 349, 350, 353
Ranunculaceæ, 32
Ranunculus Ficaria, 85
Raphia, 429
vinifera, 478
Ratibida columnifera, 73, 74
" pulcherrima, 74
Razoumoffsky, Alexander, 37
Rechsteineria, 388
artefacta, 389
cardinalis, 389
Regel, Albert, 13
Eduard von, 13, 341, 345, 376, 386, 393
Rehder, A., 8, 9, 25, 26, 28, 32, 43, 56, 70, 466
Rehderophœnix, 485, 486, 488
Reichenbach, 32, 68
Rendle, A. B., 39
Reinhardt, Johannes Christopher, 541
Johannes Theodor, 541
Mathilde Wilhelmine, 542
Reinhardtia, 486, 541-576
elegans, 189, 190, 542, 543, 545, 546-552, 562
gracilior, 189, 191, 556, 562
gracilis, 543, 545, 547, 555-568
" gracilior, 543, 556, 557, 562-565
" gracilis, 546, 548, 549, 556, 557, 558-560
" rostrata, 543, 546, 548, 549, 556, 557, 565-568
" tenuissima, 543, 548, 549, 556, 557, 560-562
Koschnyana, 543, 545, 547, 548, 549, 556, 558, 572-575
latisecta, 542, 543, 545, 547, 549, 552-555
rostrata, 565
simplex, 543, 545, 547, 548, 556, 558, 567, 568-572
spinigera, 191, 192, 547, 576
Rhamnaceæ, 51
Rhapis, 426, 430
excelsa, 478
flabelliformis, 478
humilis, 478
Rhipsalidopsis, 328
Gaertneri, 339
" Gaertneri, 339
" Tiburtii, 339, 342
Graeseri, 342
rosea, 339, 342
Rhipsalis, 343
cereuscula, 343
clavata, 343
cribrata, 343
epiphylloides, 343
Gaertneri, 342
Graeseri, 342
Rhipsaphyllopsis Graeseri, 342
Rhododendron calendulaceum, 56
flavum, 55
luteum, 56
Rhopalostylis, 540
Richard, 68
Ricker, P. L., 46
Roberts, R. H., 332, 345
Robinia sinica, 43
Robinson, W., 341
Rodigas, Emile, 399
Rodin, 448
Rogers, Owen, 382
Rosaceæ, 40
Rosanowia hybrida, 392
ornata, 392
Rose-Apple, 54
Rose, J. N., 319, 320, 321, 322, 324, 325, 327, 329, 332, 333, 341, 343, 344
Rost, E. C., 319, 321
Roxburgh, W., 28
Royal Palm, 114
Royle, J. F., 50
Roystonea, 114, 117, 428, 432
borinquena, 116, 126
caribæa, 120, 126
elata, 128, 129, 478
floridana, 116, 128
hispaniolana, 117, 127
jamaicana, 117, 126
Jenmanii, 131, 132
lenis, 117, 123, 124
oleracea, 116, 119, 120, 121, 133
" excelsior, 122
peregrina, 127, 128
princeps, 123
regia, 116, 117, 129, 130
" maisiana, 129
" pinguis, 129
stellata, 117, 123

venezuelana, 124, 125
ventricosa, 133
violacea, 117, 126
Rubiaceæ, 69
Rubun, 443
Rudbeckia columnaris, 74
columnifera, 74
Ruff, Marion E., 93
Rumphius, 296, 299, 302
Rupung, 439
Rüst, 340, 345
Rutaceæ, 49

Sabal, 427, 430
Adansonii, 478
Blackburnia, 478
Blackburniana, 478
minor, 426, 478
Palmetto, 478
umbraculifera, 478
Sabulina procera, 29
Safford, W. E., 450, 476, 477
Saguaster minor, 296, 299, 300, 302, 303
Sagus, 438
amicarum, 439
Saint-Leger, L., 388
Saintpaulia diplotricha, 69
ionantha, 69
kewensis, 69
tongwensis, 69
Salacca, 428, 431
edulis, 478
Salisbury, Richard, 12
Salm-Dyck, 322
Salt, Henry, 420
Sapodilla, 59
Sapota Achras, 61
mammosa, 61
zapotilla, 61
Sapotaceæ, 59
Sapote, 59
Sargent, C. S., 100, 101
Sargile, 299
Sawada, K., 78
Saxifraga, 39
decipiens, 39
rosacea, 39
Saxifragaceae, 39
Schauer, 280
Scheeria lanata, 375
Scheffer, 444
Schiede, 247
Schinz, H., 73
Schipp, W. A., 233
Schlechtendal, 246, 247
Schlechter, 30
Schlumberger, M., 330, 335
Schlumbergera, 328-337
Bridgesii, 329, 330
epiphylloides, 330
Gaertneri, 340
" *Makoyana*, 340
Russelliana, 329, 330, 341
truncata, 329
" Altensteinii, 330
" delicata, 330
Schneider, Camillo, 27, 56
Schomburgk, Robert, 31
Schrader, Prof., 30
Schubert, Bernice C., 9, 246
Schultes, R. E., 174, 189, 191, 197, 205, 223, 274, 352
Schulz, Mrs. Peggie, 375
Schumann, K., 63, 319, 320, 321, 322, 323, 327, 329, 330, 332, 337, 338, 341, 342, 345
Schweickerdt, 17
Sciadocalyx Lucianii, 386
Scrophulariaceæ, 66
Scyphokentia Krameri, 462
Seaforthia jaculatoria, 300
Sealy, J. R., 13, 18, 65
Sedum, 39
guatemalense, 39
oregonense, 39
nubrotinctum, 39
Watsonii, 39
Seemann, B. C., 461, 483, 484, 513, 515, 518, 533, 534, 535
Selaginella, 7
cuspidata, 7
" *Emiliana*, 7
Emmeliana, 7
pallescens, 7
Selaginellaceæ, 7
Selenicereus, 324
megalanthus, 325
Sellow, 332
Serenoa, 210, 215
arborescens, 212
repens, 211
Sesse, 250
Shadbush, 40
Sharp, A. J., 74, 201, 562
Sheehan, Marion Ruff, 263, 295, 482
Sideroxylon Sapota, 61
Siebold, P. F., 7, 8, 12, 48
Siemssen, 356
Silk-Grass, 14
Sinningia, 389-392
cerina, 390
concinna, 395
conspicua, 392
eumorpha, 389, 390, 391
macrophylla, 390
Maximiliana, 389
ornata, 392
pronopes, 392
speciosa, 389, 390
Youngeana, 392
Siphokentia, 309-315
Beguinii, 307, 309, 310-315
pachypus, 307, 310, 311
Siris-Tree, 44
Sitodium altile, 27

Skeels, H. C., 44
Small, J. K., 14, 213, 359
Smiley, Nixon, 480
Smith, A. C., 461, 483, 520, 535
A. Donaldson, 420
Sir James, 52, 67
Sir William Wright, 18, 57, 58
Smithiantha, 392
achimenoides, 396
'Exoniensis', 393
hyacinthina, 393
hybrida, 393
'Orange King', 393
'Refulgens', 393
'Robusta', 393
Snowball, Japanese, 70
Soja hispida, 48, 49
Max, 46, 49
Solanaceæ, 65
Solisia, 324
Sollya fusiformis, 39
heterophylla, 39
Sorghum, 79
caudatum, 79
vulgare caudatum, 79
Soybean, 45
Spach, E., 71, 349, 354, 355, 358, 364, 365
Sphenomeris, 5
chusana, 5
Splitgerber, L., 152, 177
Splitgerbera, 177
Sprague, T. A., 50, 51
Stachys, 63
lanata, 63
olympica, 63
Stafleu, F. A., 320, 433
Stahel, Gerold, 138, 153, 178
Standley, P. C., 247
Stapf, Otto, 13, 20, 52, 57, 410, 411, 417
Star-Flower, Spring, 19
Stearn, W. T., 5, 12, 14, 15, 18, 19, 33, 50, 65, 279, 413
Steele, E. L., 80
Steinmannia, 265
Stenogastra concinna, 395
multiflora, 395
Stenoloma, 5
Stern, F. C., 33
Steudner, 420
Steven, 38
Steyermark, J. A., 125
Stickman, Olaf, 44
Stockwell, P., 332, 345
Stone, General Roy, 116
Storck, 540
Stramonium spinosum, 85
Streptocarpus, 393
cyaneus, 394
Dunnii, 394
hybridus, 393
parviflorus, 394
polyanthus, 394
Rexii, 394
Saundersii, 394
Woodii, 394
Streptogloxinia, 399
Strongylocaryum, 485, 486, 488
Stroxinia, 399
Struckmeyer, B. E., 332, 345
Styrosinia, 389
Suessenguth, 253, 254
Suguira, T., 332, 333, 345
Swabey, C., 162
Swingle, W. T., 49
Synechanthus, 486
angustifolius, 203
ecuadorensis, 203
fibrosus, 201
mexicanus, 199, 200, 562
panamensis, 201, 202
Warscewiczianus, 201, 203
Syzygium aromaticum, 53
Jambos, 54
Smithii, 54

Tacinga, 325
Tapeinotes Carolina, 392
Tausch, 352, 356, 364
Taxus Harringtonia, 8
Tchihatcheff, Pierre de, 21
Tepejilote, 565
Tephrocactus, 325
Thangithake, 535
Thellung, A., 73
Thevetia, 62
neriifolia, 62
peruviana, 62
Thevetia, 62
Thistle, Globe, 71
Thompson, C. H., 332, 345
Thrinax, 94, 99
argentea, 95, 101
bahamensis, 96
barbadensis, 98, 109
Ekmanii, 95, 96
microcarpa, 96, 97, 99, 100
Morrisii, 95, 99
parviflora, 95, 96, 99, 100
ponceana, 96, 97, 98
Thrincoma alta, 114
Thringis latifrons, 114
laxa, 114
Thuya occidentalis Mastersii, 77
" *plicata*, 77
plicata, 77
Thunberg, Carl Peter, 22, 32, 36
Tikari, 46
Tilia, 82
grandifolia pyramidalis, 82
platyphyllos fastigiata, 82
" *pyramidalis*, 82
Tournefort, 40, 45
Towe'el, 476
Traub, H., 16
Trachyandra echeandioides, 246
nana, 246

Trachycarpus, 426, 430
Fortunei, 478
Tracy, S. M., 409
Triana, J., 383
Trichosporum Lobbianum, 67
pulchra, 67
Tricker, Wm., 31
Triteleia, 20, 264, 265
crocea, 294
grandiflora, 20, 279, 294
hyacinthina, 20, 294
ixioides, 20, 294
laxa, 20, 279, 294
peduncularis, 294
Triteleiopsis, 264, 265
Tristagma, 265, 280
nivale, 294
Tulipa, 13
chrysantha, 13
Clusiana chrysantha, 13
" stellata, 13
dasystemon, 13
" *stellata*, 13
stellata chrysantha, 13
tarda, 13
Tulisma, 389
Tulophos, 279
Tuttill, 395
Tuyama, 449
Tydæa Ceciliæ, 387
Decaisneana, 384
Eeckhautii, 387
gigantea, 384
Hansteinii, 385
Hillii, 386
hybrida, 384
" *grandiflora*, 385
" *nana*, 385
Lenneana, 386
Lindeniana, 380
Lindenii, 380
magnifica, 383
Meyendorfii rubra, 387
Ortgiesii, 387
pulchra, 387
pyramidalis multiflora, 388
Regelii, 386
Rossiana, 387
venosa, 388
'Vesuvius', 387
Warscewiczii, 384

Uhl, Charles H., 332, 333
Ulmus, 79
campestris sarniensis, 79
carpinifolia Koopmannii, 79
" sarniensis, 79
foliacea Wheatleyi, 79
Koopmannii, 79
stricta sarniensis, 79
Umbelliferæ, 55
Unger, F. J., 10
United States Plant Introduction Garden, 481, 563
Uphof, J. C. Th., 17, 18
Urban, I., 117
Urd, 46

Vaccinium Oxycoccos, 85
Valoradia, 410
abyssinica, 420
plumbaginoides, 411
Vandelli, D., 279
VanHoutte, 388, 393, 395, 396, 398
Van Oostroom, 11
Vatke, 247
Vaupel, F., 332, 337, 338, 342, 345
Veitchia, 483-536
arecina, 483, 490, 491, 513-514
Canterburyana, 535
filifera, 490, 515, 521, 526, 533-534
Hookeriana, 483, 490, 491, 495, 526-529
Joannis, 461, 481, 483, 484, 485, 486, 487, 490, 491, 494, 495, 508, 509-513, 521
Macdanielsii, 482, 486, 487, 490, 491, 495, 496-499, 530
Merrillii, 481, 490, 491, 501-506
Metiti, 483, 490, 491, 495, 499, 530
Montgomeryana, 481, 486, 487, 490, 491, 492-496, 499, 530
pedionoma, 492, 517, 524-526, 534
petiolata, 485, 487, 491, 517, 520-521
Pickeringii, 517, 534-535
sessilifolia, 481, 485, 486, 487, 491, 515, 521-524, 526, 534
simulans, 485, 487, 490, 491, 506-508, 533
Smithii, 492, 516, 519-520, 524
spiralis, 483, 484, 487, 491, 495, 529, 530-532
Storckii, 483, 484, 535, 538
subglobosa, 483, 484, 491, 495, 508, 532-533
vitiensis, 487, 490, 491, 514-519, 524, 532, 535
" microcarpa, 515, 517, 518-519
" Parhamiorum, 515, 518
" vitiensis, 515, 516-518
Winin, 480, 481, 486, 491, 495, 499-501, 530
Veitch, James, 483, 484, 532
John Gould, 484, 512, 513
Nurseries, 395
& Sons, 397
Velez, I., 186
Verbascum Myconii, 68
Verschaffelt, 380
Vetch, Purple, 43
Vial, Pere, 57
Viburnum plicatum, 70
" *plenum*, 70
" tomentosum, 70

tomentosum, 70
" *plenum*, 70
" *sterile*, 70
Vicia, 43
albicans, 43
atropurpurea, 43
benghalensis, 43
Broteriana, 43
incana, 43
trichocalyx, 43
Victoria amazonica, 30
regalis, 30
regia, 30
" Randii, 31
regina, 30
reginæ, 30
Viegas, Ahmes Pinto, 135, 137, 140
Vigna, 44
Catjang, 44
cylindrica, 44
Villareal, M., 205
Vines, 70
Violet, African, 68
Vitellaria mammosa, 61
Vitiphœnix, 486, 487
filifera, 533
pauciflora, 535
pedionoma, 524
petiolata, 520
Pickeringii, 534
samoensis, 536
Seemanni, 536
sessilifolia, 521
Smithii, 519
vitiensis, 514
Withmiana, 536
Vitman, F., 37
Vogel, 385, 388
Volkens, 443
Vuleito, 540
Vuylsteke, C., 513

Waby, J. F., 131
Wallace, Alfred Russel, 94, 148
Waller, 361
Wallichia, 430
disticha, 428, 478
Walnut, Japanese, 26
Walpers, W. G., 50, 376
Ward, F. K., 57
Watson, Sereno, 19, 280
W., 51, 341, 345
Watt, 36
Weatherby, C. A., 5, 50
Weber, A., 321, 327, 329, 330, 332, 337, 342, 343, 345
Wedel, H. von, 571
Wendland, H., 10, 69, 189, 197, 201, 211, 212, 214, 461, 483, 484, 485, 512, 513, 515, 531, 532, 533, 534, 535, 540, 542, 554, 555, 566, 570, 571, 572
Werdermann, E., 318, 320, 324, 327, 342, 345
Wettstein, R., 44
Wiegand, K. M., 40
Willdenow, Carl, 26, 28, 38, 45, 115
Williams, L., 564
L. J. C., 413
Wilson, E. H., 7, 8, 14, 58, 80, 466
R. G., 375, 378, 398, 481
Winin, 501
Woodson, R. E., 62
Woodsonia, 239
Scheryi, 239, 242
Woundwort, Woolly, 63
Wright, C. H., 117, 130, 134, 214
J. Harrison, 217

Ya-bo-ga-dau, 238
Ye-dza, 238
Yucca, 14
concava, 14
filamentosa, 14
Smalliana, 14
Yuncker, T. G., 496
Yuyba, 173
dakamana, 173
essequiboensis, 173
Gleasonii, 174, 176
Maguirei, 173
paula, 173
Schultesii, 174, 175
simplicifrons, 173
Stahelii, 173
trinitensis, 173
Yu-yu, 173

Zephyranthes, 16
carinata, 16
grandiflora, 16
rosea, 16
Zippel, 296
Ziziphus, 51
Zizyphus, 51
Zombia antillarum, 95, 96
Zuccarini, J. G., 7, 8, 48
Zygocactus, 320, 328, 329
opuntioides, 338
truncatus, 333
" crenatus, 334
" *delicatus*, 330